



VOL. VI.

RECTUM AND ANUS DIS. OF

TO
ZINC.

GENERAL INDEX.



THE LIBRARY
OF
THE UNIVERSITY
OF CALIFORNIA
LOS ANGELES

ANNUAL
AND
ANALYTICAL CYCLOPÆDIA
OF
PRACTICAL MEDICINE

BY
CHARLES E. de M. SAJOUS M.D.

AND
ONE HUNDRED ASSOCIATE EDITORS

ASSISTED BY
CORRESPONDING EDITORS COLLABORATORS
AND CORRESPONDENTS

Illustrated with Chromo-Lithographs Engravings and Maps

VOLUME VI



PHILADELPHIA NEW YORK CHICAGO
F. A. DAVIS COMPANY PUBLISHERS
1901

COPYRIGHT, 1900,
BY
F. A. DAVIS COMPANY.

[Registered at Stationers' Hall, London, Eng.]

Philadelphia, Pa., U. S. A. :
The Medical Bulletin Printing-house.
1916 Cherry Street.

EDITORIAL STAFF.

ASSOCIATE EDITORS.

J. GEORGE ADAMI, M.D.,
MONTREAL, P. Q.

—
LEWIS H. ADLER, M.D.,
PHILADELPHIA, PA.

—
JAMES M. ANDERS, M.D., LL.D.,
PHILADELPHIA, PA.

—
THOMAS G. ASHTON, M.D.,
PHILADELPHIA, PA.

—
A. D. BLACKADER, M.D.,
MONTREAL, P. Q.

—
E. D. BONDURANT, M.D.,
MOBILE, ALA.

—
DAVID BOVAIRD, M.D.,
NEW YORK CITY.

—
WILLIAM BROWNING, M.D.,
BROOKLYN, N. Y.

—
WILLIAM T. BULL, M.D.,
NEW YORK CITY.

—
C. H. BURNETT, M.D.,
PHILADELPHIA, PA.

—
CHARLES W. BURR, M.D.,
PHILADELPHIA, PA.

—
HENRY T. BYFORD, M.D.,
CHICAGO, ILL.

—
J. ABBOTT CANTRELL, M.D.,
PHILADELPHIA, PA.

—
HENRY W. CATTELL, M.D.,
PHILADELPHIA, PA.

WILLIAM B. COLEY, M.D.,
NEW YORK CITY.

—
P. S. CONNER, M.D., LL.D.,
CINCINNATI, OHIO.

—
FLOYD M. CRANDALL, M.D.,
NEW YORK CITY.

—
ANDREW F. CURRIER, M.D.,
NEW YORK CITY.

—
ERNEST W. CUSHING, M.D.,
BOSTON, MASS.

—
GWILYM G. DAVIS, M.D.,
PHILADELPHIA, PA.

—
N. S. DAVIS, M.D.,
CHICAGO, ILL.

—
AUGUSTUS A. ESHNER, M.D.,
PHILADELPHIA, PA.

—
J. T. ESKRIDGE, M.D.,
DENVER, COL.

—
SIMON FLEXNER, M.D.,
PHILADELPHIA, PA.

—
LEONARD FREEMAN, M.D.,
DENVER, COL.

—
S. G. GANT, M.D.,
NEW YORK CITY.

—
J. MCFADDEN GASTON, SR., M.D.,
ATLANTA, GA.

—
J. MCFADDEN GASTON, JR., M.D.,
ATLANTA, GA.

E. B. GLEASON, M.D.,
PHILADELPHIA, PA.

J. E. GRAHAM, M.D.,
TORONTO, ONT.

EGBERT H. GRANDIN, M.D.,
NEW YORK CITY.

LANDON CARTER GRAY, M.D.,
NEW YORK CITY.

J. P. CROZER GRIFFITH, M.D.,
PHILADELPHIA, PA.

C. M. HAY, M.D.,
PHILADELPHIA, PA.

FREDERICK P. HENRY, M.D.,
PHILADELPHIA, PA.

L. EMMETT HOLT, M.D.,
NEW YORK CITY.

EDWARD JACKSON, M.D.,
DENVER, COL.

W. W. KEEN, M.D.,
PHILADELPHIA, PA.

NORMAN KERR, M.D., F.L.S.,
LONDON, ENGLAND.

EDWARD L. KEYES, JR., M.D.,
NEW YORK CITY.

ELWOOD R. KIRBY, M.D.,
PHILADELPHIA, PA.

L. E. LA FÉTRA, M.D.,
NEW YORK CITY.

ERNEST LAPLACE, M.D., LL.D.,
PHILADELPHIA, PA.

R. LÉPINE, M.D.,
LYONS, FRANCE.

F. LEVISON, M.D.,
COPENHAGEN, DENMARK.

A. LUTAUD, M.D.,
PARIS, FRANCE.

G. FRANK LYDSTON, M.D.,
CHICAGO, ILL.

F. W. MARLOW, M.D.,
SYRACUSE, N. Y.

SIMON MARX, M.D.,
NEW YORK CITY.

F. MASSEI, M.D.,
NAPLES, ITALY.

ALEXANDER MCPHEDRAN, M.D.,
TORONTO, ONT.

E. E. MONTGOMERY, M.D.,
PHILADELPHIA, PA.

HOLGER MYGIND, M.D.,
COPENHAGEN, DENMARK.

W. P. NORTHRUP, M.D.,
NEW YORK CITY.

RUPERT NORTON, M.D.,
WASHINGTON, D. C.

H. OBERSTEINER, M.D.,
VIENNA, AUSTRIA.

CHARLES A. OLIVER, M.D.,
PHILADELPHIA, PA.

WILLIAM OSLER, M.D.,
BALTIMORE, MD.

F. A. PACKARD, M.D.,
PHILADELPHIA, PA.

LEWIS S. PILCHER, M.D.,
BROOKLYN, N. Y.

WILLIAM CAMPBELL POSEY, M.D.,
PHILADELPHIA, PA.

W. B. PRITCHARD, M.D.,
NEW YORK CITY.

JAMES J. PUTNAM, M.D.,
BOSTON, MASS.

—
B. ALEXANDER RANDALL, M.D.,
PHILADELPHIA, PA.

—
CLARENCE C. RICE, M.D.,
NEW YORK CITY.

—
JOHN D. RICHARDS, M.D.,
LIBERTY, N. Y.

—
ALFRED RUBINO, M.D.,
NAPLES, ITALY.

—
LEWIS A. SAYRE, M.D.,
NEW YORK CITY.

—
REGINALD H. SAYRE, M.D.,
NEW YORK CITY.

—
JACOB E. SCHADLE, M.D.,
ST. PAUL, MINN.

—
JOHN B. SHOBER, M.D.,
PHILADELPHIA, PA.

—
J. SOLIS-COHEN, M.D.,
PHILADELPHIA, PA.

—
SOLOMON SOLIS-COHEN, M.D.,
PHILADELPHIA, PA.

—
H. W. STELWAGON, M.D.,
PHILADELPHIA, PA.

—
D. D. STEWART, M.D.,
PHILADELPHIA, PA.

—
LEWIS A. STIMSON, M.D.,
NEW YORK CITY.

J. EDWARD STUBBERT, M.D.,
LIBERTY, N. Y.

—
A. E. TAYLOR, M.D.,
SAN FRANCISCO, CAL.

—
J. MADISON TAYLOR, M.D.,
PHILADELPHIA, PA.

—
M. B. TINKER, M.D.,
PHILADELPHIA, PA.

—
CHARLES S. TURNBULL, M.D.,
PHILADELPHIA, PA.

—
HERMAN F. VICKERY, M.D.,
BOSTON, MASS.

—
F. E. WAXHAM, M.D.,
DENVER, COL.

—
J. WILLIAM WHITE, M.D.,
PHILADELPHIA, PA.

—
W. NORTON WHITNEY, M.D.,
TOKIO, JAPAN.

—
JAMES C. WILSON, M.D.,
PHILADELPHIA, PA.

—
C. SUMNER WITHERSTINE, M.D.,
PHILADELPHIA, PA.

—
ALFRED C. WOOD, M.D.,
PHILADELPHIA, PA.

—
WALTER WYMAN, M.D.,
WASHINGTON, D. C.

PREFACE TO THE SIXTH VOLUME.

THIS volume is the last of the first series of the present work. That the promises enumerated in the first preface have been fulfilled can readily be ascertained by referring to the voluminous index given at the end of the present volume—a mass of literature probably never before brought together within the limits of six books. The work presents “all the general diseases usually described in text-books” and besides what progressive features the past decade has furnished. A number of subjects contain no excerpts from literature; in such instances the chief- and department- editors have thought it more advantageous to incorporate the new ideas recently contributed by investigators within the text proper. In some, indeed, nothing but new facts could be introduced, so radically did the modern conception of the given subject differ from the older. On the other hand, some subjects could not be granted excerpt matter, because investigation had given them but little if any attention during the last decade, or because nothing new had been contributed.

Surgical subjects have been given space corresponding with their practical importance. The aim has not been to repeat what any physician already has several times upon his shelves—the classic procedures incorporated in books on minor surgery and repeated in the larger works, such as ligations, amputations, resections, etc.—but under each surgical disease, the special procedure indicated, besides the mere mention of the necessity of such an operation as amputation, resection, etc., is also furnished when such a special procedure has been devised. The subject of “Obstetrics” is replete with subdivisions which are but seldom if ever modified and which represent the foundation of every accoucheur’s education. All these have not been incorporated within the limits of the *CYCLOPÆDIA*. The various articles given bear upon the subdivisions which are undergoing progressive change and are intended to convey views that are in keeping with progress elsewhere. As regards “Therapeutics,” the subjects considered represent the remedies still more or less used, our text-books being replete with agents which may be said to be obsolete, from the fact that they have been replaced by others of far greater efficacy. The various specialities have received due attention, the aim being to furnish the general practitioner with a clear outline of the entire field of practical medicine.

The editor thought it necessary, when he projected the work, to eliminate individual symptomatic manifestations as special subjects and to only consider these under the diseases of which they form part. The first preface specifies this feature of the general plan. By saving space elsewhere, however, he was able to introduce many subjects, such as deaf-mutism, eclampsia, menopause, etc., which usually receive but scant notice in text-books, and series of disorders such as hypnotism, hysteria, etc., which are seldom treated separately in such books.

Indeed, it may truthfully be claimed that the *CYCLOPÆDIA* contains more than was promised, and that without imposing upon its reader additional expense.

The sixth volume contains a large number of valuable articles, most notable of which are "Rheumatism," by Dr. Levison, of Copenhagen; "Diseases of the Stomach," by Prof. D. D. Stewart, of Philadelphia; "Surgery of the Stomach and Intestines," by Prof. W. W. Keen and Dr. M. B. Tinker, of Philadelphia; "Surgery of the Spine," by Prof. R. H. Sayre, of New York; "Syphilis," by Prof. G. F. Lydston, of Chicago; "Surgery of the Urinary System," by Prof. J. W. White and Dr. A. C. Wood, of Philadelphia; "Diseases of the Uterus," by Prof. H. T. Byford, of Chicago; and "Diseases of the Uterine Adnexa," by Prof. E. E. Montgomery, of Philadelphia; "Wounds and Injuries of the Chest," by Prof. L. A. Stimson and Dr. E. L. Keyes, Jr., of New York; and "Yellow Fever," by Surgeon-General Wyman, of Washington. To all these gentlemen, and the other members of the editorial staff, the editor wishes to extend expressions of sincere gratitude, since he owes mainly to their co-operation the great success which the *CYCLOPÆDIA* can claim as having attended its career.

The "General Index" represents a feature of the work calculated to assist the reader in locating the articles in which a given subject is treated, or indirectly considered. The page number is not given owing to the constant changes which the work is undergoing as new matter is being introduced. Dr. Florence A. Dyer, of the Central Department, has merited great appreciation for her painstaking efforts in its preparation, and it is hoped that much assistance will be afforded our readers.

Death has again claimed two of the *ANNUAL AND CYCLOPÆDIA*'s department editors, whose valued contributions have been greatly appreciated by our readers—Prof. Landon Carter Gray died on May 8th and Prof. Lewis A. Sayre on September 21, 1900. The special fields to which they devoted their efforts thus lost members who had become two of America's most brilliant representatives, and the profession at large two of its greatest educators.

THE EDITOR.

2043 WALNUT STREET,
PHILADELPHIA, NOVEMBER 1, 1900.

SAJOUS'S ANNUAL

AND

ANALYTICAL CYCLOPÆDIA OF PRACTICAL MEDICINE.

R

RECTUM AND ANUS, DISEASES OF. (See also HÆMORRHOIDS, volume iii.)

Irritable Ulcer of the Rectum, or Fissure of the Anus.

Definition. — Primarily, a superficial breach of the mucous membrane in the anal region, which, if unhealed, finally results in the formation of an ulcer of the bowel. This may involve both the mucous and submucous coats, and give rise to a spasmodic contraction of the parts and paroxysmal pain.

Symptoms. — In the early stages the symptoms are not usually marked or even severe. They are generally experienced during defecation, when at some point or other there will be an uneasy sensation, consisting of an itching, pricking, slight smarting, or a feeling of heat about the circumference of the anus. As the disease progresses the discomfort attending the movements of the bowel is greatly augmented; there may be severe pain, of a burning or lancinating character. This is followed by throbbing and excruciating aching, attended by violent spasmodic contraction of the sphincter-muscles, continuing from half an hour to half the day. While the pain lasts the patient is usually incapacitated for work. The slightest movement sometimes greatly aggravates the suffering.

After an indefinite period the pain subsides or entirely disappears, the patient feeling fairly comfortable or even perfectly well, and to all outward appearance he would continue so were it not for the knowledge that the subsequent passage of fecal matter will bring with it a recurrence of agony. In consequence of this dread, the act of defecation is postponed as long as possible, with the result that when the evacuation does take place the pain is greatly increased. The feces, when solid, will be passed streaked with mucus and sometimes also with blood, and when more soft will be flattened and tape-like, due to the incomplete relaxation of the sphincters. Not infrequently the appearance of such a stool leads to an erroneous diagnosis of stricture of the rectum.

When a fissure is of long duration, the general health becomes greatly impaired as a result of the constant pain, the constipation, and the frequent resort to narcotics, and the patient is liable to fall into a state of melancholy and extreme irritability. The countenance, expressive of pain, grows care-worn and sallow; the appetite is poor; and there is more or less emaciation, associated with the general appearance of a person suffering from serious organic disease. Flatulence generally attends severe cases;

it is not only troublesome, but also painful, the passage of gas being almost certain to bring on a paroxysm of pain.

The ulcer is usually located just within the anus, beginning at the muco-cutaneous junction, Hilton's line, and extending upward toward the rectum for a distance seldom exceeding half an inch. It may occupy any portion of the circumference of the anal region, but its usual site is at its posterior, or coccygeal, side. Although this lesion is usually solitary, we sometimes find it multiple, especially when it is of syphilitic origin.

Diagnosis.—The signs are so characteristic of the lesion that it is almost impossible for a diagnostic error to be made. The peculiar nature of the pain, the time of its occurrence (either during or some time after an evacuation of the bowels), its continued increase until it becomes almost unbearable, and its gradual decline and entire subsidence until the next evacuation clearly point to irritable ulcer of the anus, and in most instances should be sufficient to establish a diagnosis. Yet in numerous well-authenticated cases mistakes have been made and patients suffering from this disease have been treated for neuralgia, uterine or vesical affections, stricture, and even hæmorrhoids.

This disease is very readily distinguished from neuralgia by the absence in the latter of any breach of surface or of any other disease of the mucous membrane of the rectum; by the entire want of connection between the pain and the alvine discharge, and by the constant suffering. In neuralgia the pain caused by pressure with the finger in the anus is not confined to one spot, as it is in fissure, but all parts of the bowel are alike tender.

The symptoms of anal fissure often simulate closely those of uterine disease

and bladder affections. Spasm of the sphincters in these cases may also simulate stricture, but a thorough examination will dispel all uncertainty.

Frequently, uterine disorders or hæmorrhoids are associated with the fissure; in this event the case is treated for either one or the other of the first two complaints, the presence of the other lesion being unsuspected and consequently neglected. In all such instances a careful inspection of all the parts will at once prevent all errors. Small polypoid growths are often found at the upper portion of the fissure and unless removed will prevent successful treatment.

[Fissure of the rectum is one of the causes of dyspareunia, which may be diagnosed as vaginismus. The cure of the fissure will be quickly followed by relief of the symptoms. C. B. KELSEY, Assoc. Ed., Annual, '92.]

Etiology and Pathology.—Fissure is a disease of adult life, and is said to be more common among women than among men. Very young children, however, are not exempt, and my experience would lead me to suspect that it often exists in many such cases without being discovered. The intense suffering is due to the structural arrangement of the termination of the bowel, especially its nerve-supply. As is well known, the outlet of the intestine is closed by two sphincter-muscles, the external being immediately beneath and parallel to the skin surrounding the margin of the anus. On the inner side, or rectal surface, the muscles are in contact, the line of union corresponding accurately with the junction of the skin and the mucous membrane. In most cases this junction of the sphincters is marked by a line of condensed connective tissue, and is known as "Hilton's white line." Attention is drawn to this term because of an important anatomical fact, which Hilton has

pointed out in this connection: to wit, that it is the point of exit of the nerves, principally branches of the pudic, which descend between the two sphincter-muscles, becoming superficial in this situation, and are there distributed to the papillæ and mucous membrane of the anus. These nerves are very numerous, and account for the extreme sensitiveness of the part and also for its very abundant reflex communications with other organs (Andrews, "Rectal and Anal Surgery," second edition, Chicago, p. 69). The exposure of one of their filaments, either in the floor or at the edge of the ulcer, is an essential condition of the existence of irritable ulcer. The upper portion of the rectum possesses very little sensibility, as the chief nerve-supply of the organ is at its termination and around the anus; hence it is that such grave diseases as cancer or ulceration may exist in the higher parts of the bowel and not manifest their presence by pain.

Irritable ulcer may arise from a variety of causes, such as atony of the muscular coat of the rectum, or other conditions leading to constipation. In these cases the bowel becomes impacted with hardened fæces, which when discharged overstretch the delicate mucous membrane, and thus, either by irritation or by direct abrasion, the ulcer is formed. William Bodenhamer ("Anal Fissure," '68, New York) states that, in some cases of constipation, while the diaphragm and other abdominal muscles act with considerable energy, the anal sphincters remain more or less contracted, and yield but slowly, so that the indurated fæces contuse and abrade the surface of one or more points of the mucous membrane, which abrasions, if they do not heal, lay the foundation of the disease.

Irritable ulcers sometimes result from the excoriations produced by vitiated and

acid discharges, such as occur in dysentery, chronic diarrhœa, cholera, leucorrhœa, etc. Hæmorrhoids are frequently a predisposing cause and a complication. They narrow the outlet of the bowel, and through the successive inflammatory attacks to which they are subject the neighboring tissue loses its elasticity, is rendered brittle, and is more easily lacerated.

Polypi are not uncommon causes; they are usually situated at the upper or internal end of the ulcer.

Prognosis.—With proper treatment irritable ulcer can be promptly cured and practically without risk.

Treatment.—The first step is to establish regularity in the intestinal functions. Enemata or mild aperients should be employed and the diet regulated, the use of bland and unirritating food being enjoined. All drastic purges should be avoided. To obtain a daily evacuation of the bowels and to render the movement as painless as possible, a 10-grain suppository of iodoform is to be used, followed, in one-half hour, by an enema of rich flaxseed-tea, from half a pint to a pint. This should be administered every evening before retiring, the patient being then able to assume the recumbent posture, which, combined with the rest, affords the most relief from subsequent pain. Immediately after an evacuation of the bowels is obtained, another 10-grain iodoform suppository is to be inserted into the rectum. The suppository relieves the pain, and is far preferable to opiates, which tend to constipate. If the enema should prove ineffectual, another should be employed in half an hour.

PALLIATIVE MEASURES.—Palliative treatment will meet with success in a considerable proportion of cases, especially when there is no great hypertrophy of the sphincter-muscles. The Allinghams state that the curability of

this lesion does not depend upon the length of time during which it has existed, but rather upon the pathological changes it has wrought. They have cured fissures of months' standing by means of local applications, where the ulcers were uncomplicated with polypi or hæmorrhoids, and where there was not very marked spasm or thickening of the sphincters.

Rigid cleanliness is essential. The anus and the adjacent portions should be carefully sponged night and morning and after each stool with hot or cold water, the temperature being regulated to suit the patient's comfort.

Before applying remedies the ulcer should be exposed and anæsthetized with a 4-per-cent. solution of the hydrochlorate of cocaine, using a camel's-hair pencil, and repeated once or twice, at intervals of three or four minutes.

Among the remedies used the following may be mentioned: Nitrate of silver; acid nitrate of mercury; fuming nitric acid; carbolic acid; sulphate of copper; the actual cautery. Of these, the nitrate of silver is the best. It lessens or obviates the nervous irritation underlying the spasmodic contractions of the sphincters; it shields the raw and exposed mucous surface, by forming an insoluble albuminate of silver; and destroys the hard and callous edges of the ulcer.

To attain the best results, a solution of 10 to 30 grains to the ounce of distilled water should be used once in two or three days, according to circumstances. It may be applied by means of cotton attached to a silver applicator or to a piece of wood, separating the margins of the anal orifice with the thumb and index finger of the left hand. The solution is to be applied to the ulcer only; a few drops are all that will be required. If thorough local anæsthesia has been

obtained the drug produces little, if any, suffering. After each application the part should be dusted with iodoform.

When this plan of treatment fails, resort to operative measures is indicated.

Literature of '97-'98-'99.

Ichthyol is of great value in the treatment of fissure of the anus. At the first application the fissure is anæsthetized with cocaine and pure ichthyol is applied with a cotton-carrier or a glass rod. For the succeeding applications, which at first are made daily, then on alternate days, cocaine is generally unnecessary. A cure is usually achieved in from six to twelve days. Proper attention must be given to the bowels. O. Conitzer (Münch. med. Woch., Jan. 17, '99).

OPERATIVE TREATMENT.—There are three methods worthy of consideration in this connection: (1) *forcible dilatation*; (2) *incision*; (3) *a combination of these two procedures*, to wit: *forcible dilatation and incision*.

Forcible Dilatation.—This is the operation recommended by Récamier, Van Buren, and others. It consists in introducing the two thumbs into the bowel back to back, and then forcibly separating them until the sides of the bowel are stretched as far out as the tuberosities of the ischia. It is essential to place the ball of one thumb over the fissure, and that of the other directly opposite to it, in order to prevent the fissure from being torn through and the mucous membrane being stripped off. This procedure should always be done with the patient thoroughly under the influence of an anæsthetic, and it should occupy about five minutes.

The operation is a perfectly safe one, but as it is no less severe than the operation by incision and as in some cases it fails to effect a cure, there is no advantage in adopting it instead.

Literature of '97-'98-'99.

Fissure of the rectum should call for surgical, and not palliative, treatment. It is simple of cure by gentle divulsion of the sphincter-muscle. If the physician is averse to giving an anæsthetic for this purpose, he can practice moderate stretching several times with a small divulsor, and a rapid cure will be effected in the greatest number of cases. J. M. Mathews (North Carolina Med. Jour., Apr. 20, '98).

Incision.—The incision should be made through the base of the ulcer and a little longer than the fissure itself, so as to sever all the exposed nerve-filaments. The cut should divide the muscular fibres along the floor of the ulcer. In a fair proportion of cases this operation will meet with success, but it is not so certain to result successfully as the operation next to be described. It has the advantage over the other operations, however, of being nearly or entirely painless under local cocaine anæsthesia. When, therefore, general anæsthesia is contra-indicated or is refused by the patient, this method is worthy of a trial.

Dilatation and Incision.—This operation is a radical and unfailing cure. The bowels should be emptied by a dose of castor-oil and an injection, after which, under general anæsthesia, the sphincters should be dilated in the manner previously described. A straight blunt-pointed bistoury should then be drawn lightly across the surface, making a cut extending about an eighth of an inch above and below the limits of the ulcer and about a sixteenth of an inch in depth. Usually it is a good plan to curette the entire floor of the ulcer, in addition.

The after-treatment consists in keeping the patient in the recumbent position for twenty-four hours, keeping the parts cleansed, and applying iodoform. In a

week or so the parts will be perfectly well.

Fistula in Ano.

Definition.—An unnatural channel leading from a cutaneous or mucous surface to another free surface or terminating blindly in the substance of an organ or part.

Varieties.—For all practical purposes we may divide fistulæ into the following four forms: (1) the *complete*, in which there are two openings, one in the rectum and one on the skin more or less remote from the anus; (2) the *incomplete internal*, in which there is a communication with the cavity of the rectum by means of an opening in the mucous membrane, but none with the external surface of the body; (3) the *incomplete external*, in which there is an external opening through the skin, but no communication with the bowel; and (4) the *complicated*, or so-called complex, variety, in which there are many sinuses and numerous external openings. Some of these tracks run outward; some extend up the bowel beneath the mucous membrane; while others travel around the bowel and open in the other buttock, giving rise to the variety known as the horseshoe fistula. The second and third varieties named are frequently spoken of as blind fistulæ.

Symptoms.—Occasionally there is considerable pain, but more frequently only a feeling of uneasiness about the anus. When a fistula originates, as it most commonly does, from a pre-existing abscess, there is a sensation of weight about the anus, with swelling of the integument, considerable tenderness upon pressure, pain in defecation, and more or less constitutional disturbance associated with rigors.

The chief discomfort is the discharge, which varies in quantity and may be

purulent or muco-purulent. This discharge occurs from the sinus so long as it remains unhealed, soiling the linen and making it wet and uncomfortable. It often produces an excoriation of the nates. The discharge is not of itself sufficient to be a source of great exhaustion and does not interfere with ordinary occupations, so that many patients have had fistula for a considerable length of time without being conscious of any serious ailment. The escape of flatus and mucus from the bowel in cases of complete fistula will often prove a source of annoyance, as will also the passage of feculent matter, which will be expelled through the sinus should the fistulous channel be very free. An attack of secondary suppuration is always liable to complicate a fistula, and is usually due to a stoppage of the track by small particles of feces or by exuberant growth of the granulation. Such a sequel, of course, is attended with pain, until a new opening forms or one is made by the surgeon. In some cases the original fistulous track becomes re-established. Patients of neurotic habit often suffer mentally and from general weakness. As in other affections of the rectum, various reflex pains are experienced, which may be referred to the back, to the loins, and to the lower portion of the abdomen. When such pains extend down the leg and to the foot, they are liable to be attributed to sciatica, unless the history of the case is carefully studied and a critical examination is made.

Diagnosis.—Prior to the examination of the rectum the bowels should be emptied by an enema. This procedure not only renders the exploration of the parts easier and cleaner, but also, in women especially, serves to quiet the patient's fears of any untoward accident's occurring; and therefore facilitates the thor-

oughness of the surgeon's examination by securing the co-operation of the patient, as in extruding the parts, etc.

The patient should be placed in a recumbent position on a table or an examining chair, with the legs well drawn up toward the abdomen, and the buttocks brought to the edge of the couch. If the external orifice of the sinus is prominent, or if there is a sentinel granulation, the outlet of the fistula will be obvious; but when it is small and located between folds of the skin its situation may be demonstrated by making pressure with the tip of the finger in the suspected locality, which will usually cause a little drop of matter to exude. The site of a fistula may often be detected by feeling gently all around the anus with the forefinger and finding an induration suggesting a pipe-stem beneath the skin. A flexible silver probe should now be passed along the fistulous track. In doing this considerable care is requisite and the utmost gentleness should be observed, the probe being directed by its own weight through the sinus and not forcibly. If it does not pass easily, it may be bent, and "coaxed" along the channel. In the majority of instances it will pass directly into the bowel. When the probe has passed as far as it will go without the use of any force, the finger is introduced into the rectum. When it comes in contact with the free end of the probe it demonstrates the presence of a complete fistulous track. In other cases the mucous membrane is felt to intervene between the finger and the probe; in such cases the internal opening generally exists, but it is difficult to discover,—sometimes because the examiner searches for it too high in the bowel. Palpation with the sensitive tip of the finger will often render the presence of the inner orifice obvious by coming in

contact with an indurated mass of tissue. If such a spot be felt, the finger should be placed upon it and the probe passed toward the finger. There may not be an internal opening; if not, the operator should ascertain how near the probe comes to the surface of the bowel. If a doubt still exists as to the completeness of the track, any one of a variety of specula may be introduced into the rectum, and the outer orifice of the sinus injected with a solution of iodine, creolin, or of peroxide of hydrogen, when, if there be an internal opening, the appearance of the fluid within the bowel will set the question at rest. If the inner opening be not discovered by these methods, the case must be looked upon as one of external rectal fistula.

Where there are numerous external openings it is necessary to probe all of them so as to determine whether they are connected and the direction which they take. Sometimes more than one internal orifice exists.

The presence of an incomplete rectal fistula is more difficult to determine than the other varieties of this lesion which have just been considered. It is the most painful form, but fortunately it is of infrequent occurrence. Its orifice may be located anywhere in the rectum, but it is generally found between the internal and the external sphincters. According to the Allinghams, the circumference of this opening is often as large as an English three-penny piece, its edges being sometimes indurated, at other times undermined. The fæces when liquid pass into the sinus and create great suffering—a burning pain often lasting all day after the bowels have acted. In this variety of fistula the fæces are coated more or less with pus or blood and a boggy swelling is noticed at some portion of the circumference of the anus. A

peculiar feature of this swelling is often noted, viz.: its presence one day and its disappearance in a day or two, followed by an increased discharge of pus from the bowel. This is explainable by the closure of the outlet of the fistula caused either by a plug of fæces or as a result of inflammatory swelling which allows the collection of a quantity of pus and the consequent formation of the boggy tumor. The swelling disappears upon the re-establishment of the communication between the bowel and the sinus, and is attended by the profuse discharge of matter previously mentioned. This phenomenon is repeated over and over again, and, as a rule, is a pretty positive indication as to the nature of the disease. In some cases of blind internal fistula, if the orifice can be felt or if it can be seen through a speculum, a bent probe may be introduced into it and made to protrude near to the cutaneous surface of the body, where its point can be felt.

Fistulæ frequently co-exist with other rectal diseases; it is, therefore, important that an examination should be carefully made, so as to exclude such lesions as stricture, malignant or benign; hæmorrhoids, tumors, etc. A thorough physical examination of the chest should also be made, to ascertain the presence or absence of phthisis, which so frequently complicates fistula in ano.

Fistula in ano occurs oftener in subjects of pulmonary tuberculosis than in cases of the otherwise healthy and those affected with other diseases. The fistula in these cases may be either tubercular or non-tubercular in its nature. If the former it is difficult to cure by operation, and if an operation is decided upon it should be more radical than those heretofore in vogue. If the fistula is free from local tubercular involvement operation is advisable, and it will be generally successful. Fistula in ano is in no sense a salutary issue, but every

tubercular case which is annoying to the patient should be cured if possible, and endeavors should be made to so improve operative measures as to permit the subjects of tubercular fistula to be operated upon with success. E. F. Wells (Chicago Med. Recorder, Nov., '95).

Serious kidney disease should be excluded before recommending operation, for obvious reasons. In cases of caries of the vertebræ, of the sacrum, or of the pelvis, fistulous tracks may form and simulate anal fistula. In such instances a careful investigation will reveal the true origin of the trouble, and show that the case is not one of ordinary anal fistula.

Etiology.—Fistula in ano, which is not due to ulceration and perforation of the rectal wall from within, is the result of a previous abscess. Such an abscess forms in the ischio-rectal fossa, and although opened early by a free incision even before the cavity becomes distended with pus, it frequently fails to heal. It may fill up and contract to a certain extent, but it does not become obliterated; a narrow track remains, which constitutes the disease under consideration.

There are several reasons why rectal abscesses so frequently degenerate into fistulæ. One is that, owing to an internal opening's communicating with the bowel, small particles of fecal matter find their way into the sinus, and, acting as foreign bodies, prevent the healing; another, that, owing to the frequent movement of the parts by the sphincter-muscles, sufficient rest is not obtained for the completion of the reparative process; and, finally, the vessels near the rectum, not being well supported and the veins having no valves, there is a decided tendency to stasis, which is unfavorable to granulation.

According to Harrison Cripps, the surface of the fistulous track is lined with a

smooth, gelatinous membrane, which, when examined under the microscope, is found to consist of granulation-tissue exactly analogous to that which lines the interior of a chronic abscess. The leucocytes constituting the outer wall of this membrane are but loosely adherent, and, constantly becoming free, they form the chief part of the pus which drains from the fistula.

This disease is commonly met with during middle life, but it is by no means restricted to this period. The Allinghams state that they have operated upon an infant in arms and upon persons over eighty years old.

Course and Prognosis.—This disease, untreated, has a tendency to progress. The longer its duration, the more tortuous and complicated does a fistula become. Hence the earlier the patient submits to treatment, the more favorable will be the prognosis. Again, the time and extent of the treatment necessary to effect a permanent cure will be correspondingly diminished.

Treatment.—**PREVENTIVE.**—When a patient presents the symptoms of a threatened abscess in the vicinity of the rectum, he should be directed to go to bed, or at least to avoid all undue exercise; the bowels should be thoroughly evacuated, preferably by the use of a saline; the diet should be nutritious; and, if the case be seen early, hot fomentations and poultices may be applied to the parts. The early adoption of these measures may abort the threatened abscess, but very little encouragement can be given the patient.

If there be reason to suspect that pus has formed or is forming, it will be desirable to make a free incision into the centre of the affected site with a sharp, curved bistoury, if the trouble is superficial, or, if it is deep, with a narrow

straight knife. When pus is present and is deeply situated, the evacuation of the abscess will be aided by the introduction of the forefinger into the bowel; the swelling may thus be pushed forward, rendered tense, and made more apparent.

In opening these abscesses, if possible, ether or nitrous-oxide gas should be given. The patient should lie on the side upon which the threatened abscess is situated; the upper leg should be bent forward upon the abdomen. When pus is present, the operator should stand out of the line of its exit, for when the cavity is opened the pus often squirts out a considerable distance. After the matter has been discharged, the forefinger should be introduced into the abscess-cavity for the purpose of breaking down any secondary cavities or loculi that may exist. When this has been accomplished the abscess should be washed with bichloride-of-mercury solution, 1 to 4000, after which a rubber drainage-tube should be inserted; or a piece of iodoform gauze should be lightly placed between the lips of the incision, to prevent its closing too rapidly and also to allow free drainage. Careful daily attention should be paid to the wound while the cavity of the abscess is contracting, as it is important to maintain a free and dependent outlet for the discharge that may continue to be secreted, but stuffing and distension of the cavity should be avoided. If a drainage-tube be used, it should be shortened from day to day as the wall of the abscess contracts.

After an operation for rectal abscess the patient should be kept quiet for several days, and if great care be taken, both with the subsequent drainage and in keeping the orifice open, the parts may heal without the formation of a fistula.

PALLIATIVE TREATMENT will be required where there is a positive refusal

on the part of the patient to submit to an operation, and in persons whose general health is broken down and in whom the reparative powers are inadequate. Chronic alcoholism, albuminuria, diabetes, malignant disease, etc., are conditions in which operative measures may be attended with risk and in which it may be advisable to resort to palliative measures. Phthisis is not an absolute contra-indication to operative measures. The rule usually followed is to operate in those cases of tubercular subjects in which the disease is quiescent, but to avoid such interference if the lung mischief is active.

Incomplete external fistulæ and even complete fistulæ of somewhat recent origin and not extensively indurated may be cured by non-operative measures; but such treatment requires constant attention on the part of the practitioner as well as a willingness on the part of the patient to give sufficient time to the treatment. Even under such circumstances the process of repair is slow, and in many cases the result will not be perfectly satisfactory. It is true that fistulæ sometimes recover spontaneously or are cured by simple means, such as the mere passage of a probe used in examining the fistulous track; but instances of this kind are rare. In certain selected cases of fistula a cure may be effected by stimulating the sinus and allowing free drainage. This is done so as to avoid the use of the knife, when possible. To obtain satisfactory results the following indications should be borne in mind: That the external orifice should be perfectly free; that the sinus should be kept clean, so as to prevent putrefactive changes; that an effort be made to excite a healthy action in the fistulous channel; and, finally, that the parts be kept as quiet as possible. To meet the first indication, it is neces-

sary to dilate the outer opening of the fistula with sponge or sea-tangle tents, or with Lee's antiseptic slippery-elm tents. The latter are made of selected slippery-elm bark and are compressed under high pressure. Owing to their non-irritating and demulcent properties, they are to be preferred. The second indication (that the sinus be kept clean, so as to prevent putrefactive changes) is best carried out by the use of bichloride-of-mercury solutions 1 to 4000 or carbolic-acid solutions 1 to 80. Such solutions are injected into the sinus by means of a long, flexible silver cannula attached to an hypodermic syringe. The third indication (to excite a healthy action in the sinus) can be met in one of a number of ways. Anæsthesia of the channel with an injection into the sinus of a 2-per-cent. solution of cocaine, using the same syringe and cannula that are used for cleansing the fistula, is desirable. If the wall of the sinus is somewhat indurated, it is better to insert a small, flexible curette and scrape the wall of the fistula along its entire length; or Mathews's fistulatome may be used. The sinus is now prepared for some one of the various stimulating substances which have been recommended for this purpose. Among these may be mentioned tincture of iodine, 1 part to 4 of water; nitrate of silver, 20 to 60 grains to the ounce; sulphate of copper, a saturated solution, or carbolic acid mixed with equal parts of glycerin and water. These substances may be applied by means of cotton attached to a silver probe or to an applicator, or they may be injected into the sinus by means of a syringe and silver cannula.

If the fistula be a complete one and the substance used be applied as an injection, the finger should be passed into the rectum and made to cover the internal

orifice of the sinus, so as to prevent the escape of any of the fluid into the bowel.

Regarding the fourth point (keeping the parts at rest), the patient, while under treatment, should be confined to the horizontal position either in bed or on a sofa; congestion of the parts is thereby lessened. A firm pad placed over the anus and supported by a T-bandage is useful in limiting the motions of the parts, due to the alternate contraction and relaxation of the levator-ani muscle. The chance of success in the palliative treatment of this disease will be greatly increased if due attention be paid to the general health of the patient; when circumstances render it possible, a change of air should be advised.

Literature of '97-'98-'99.

Certain superficial or marginal fistulæ following fissures, or slight trauma, or very small abscesses, may heal, and heal permanently, if left to themselves and kept perfectly clean. Such cleanliness, however, must be persistent and scrupulous. Not only must the parts be washed at least once daily, and more often in warm weather, but they must be cleaned carefully after each movement of the bowels, and should be irrigated with some mild antiseptic or astringent, such as myrrh-wash or dilute liquor plumbi subacetatis. After the washing they must be made and maintained perfectly dry. After wiping out the sinus, filling it with some inert powder or with powdered boric acid is at times of undoubted benefit. Blake (*Boston Med. and Surg. Jour.*, Sept. 2, '97).

OPERATIVE TREATMENT.—The surgeon should examine the patient carefully, not only locally, but also as to the state of his general health, for fistula in ano is not infrequently complicated with other lesions which may render operative procedures inadvisable. Thus, when a fistula is associated with a stricture of the rectum of a malignant nature any

operative interference on the former lesion will be out of the question. If it be a simple stricture and its existence be not recognized, or if it be not treated, any operation performed on the fistula will usually fail to effect a cure.

Incision.—In a number of instances the operation which is sanctioned by experience as the most prompt, certain, and safest in its results is to lay open the sinus into the rectum, dividing with the knife all the tissues intervening between its cavity and that of the bowel. The bowels should be moved by means of castor-oil or some other mild cathartic on the day preceding the operation, and on the morning of the latter the lower bowel should be evacuated by means of an enema.

After etherization the patient should be placed on the side on which the fistula exists, the buttocks being brought to the edge of the table. Occasionally the lithotomy posture is preferable, as in cases in which there is a complex fistula. The first step in the operation is to dilate the sphincter-muscles slowly, but steadily, by introducing the thumbs into the rectum, back to back, and making gradual pressure around the anal orifice until the muscular contraction is overcome.

In dealing with complete fistulæ a flexible probe-pointed director is passed through the sinus, and is then brought out of the anus by means of the forefinger of the left hand introduced into the bowel. The tissues lying upon the director are then to be divided with a sharp bistoury. A careful search is now to be made for any diverticula, which, if found, should be divided. If none exist, the granulations lining the track should be scraped or cut away. The healing process will be greatly facilitated by removing with scissors all over-

topping edges of skin and mucous membrane. If the internal opening be more than an inch from the anus, a probe-pointed bistoury should be introduced into the fistula upon a director and its point made to impinge upon a finger placed in the rectum. As the finger and the instrument are withdrawn, the necessary incision is made. Or the director can be passed through the sinus and a wooden gorget inserted into the bowel, after which the track can be divided with an ordinary bistoury. The gorget prevents the opposite side of the bowel from being injured should the knife slip.

When the track of the fistula is much indurated and considerable force is therefore required to make the incision, it will be better to perform the operation by means of Allingham's spring-scissors and special director. With these instruments, fistulæ running high up in the bowel may be divided no matter how dense they may be. The director is made with a deep groove, the transverse section of which is more than three-quarters of a circle; in this the globe-shaped probe-point of one blade of the scissors runs. When placed in the groove the blade cannot slip out. The director having been passed through the sinus, the forefinger of the left hand is introduced into the bowel, and the probe-pointed blade of the scissors is inserted into the groove of the instrument and runs along it, cutting its way out through the diseased tissue as it advances, the finger in the bowel preventing the healthy structure from being wounded.

A frequent error in operating on fistulous cases consists in not keeping to the sinus, the director being pushed through the track-wall, and then being free to roam about in the cellular tissue of the part, at the operator's will. In this manner a portion of the fistulous

channel is left, and an unnecessary amount of the tissues is divided. Such a mistake can always be avoided by taking plenty of time in performing the operation and by careful sponging of the sinus as it is laid open, in order to follow the track of the granulation-tissue lining it, which by this simple means is freely exposed to view.

The method of treating external rectal fistulæ must vary according to the direction and extent of the track. If the mucous membrane alone intervenes between the finger introduced into the bowel and a probe passed along the sinus, the channel should be transformed into a complete fistula by perforating the mucous membrane with the probe, or with a director, at the uppermost limits of the fistulous channel. The regular operation for complete fistula is then to be performed by dividing the intervening septum between the fistula and the bowel. In cases in which the sinus is directed away from the rectum, the proper course is not to divide the sphincters, but freely to enlarge the external orifice and to maintain free drainage.

The treatment of incomplete internal rectal fistulæ invariably demands operative interference at the earliest possible moment after a diagnosis is made, for if left alone its tendency is to burrow. The operation for this variety of fistula consists in making it a complete fistula and in dividing the intervening structures between the bowel and the sinus. This is best performed by introducing a probe-pointed director, bent at an acute angle, into the bowel, and passing the bent portion through the internal opening. This done, the point of the probe can be felt subcutaneously and cut down upon and the remainder of the operation completed.

In dealing with complex fistulæ the

surgeon must be guided by the peculiarities of each case. In operating upon a horseshoe fistula it is important to recognize the true condition of affairs; for a careless or inexperienced observer might think that he had two separate fistulæ to deal with and operate accordingly.

Immediate Suture.—In otherwise healthy subjects, a method of operating which has met with success, especially in this country, consists in the immediate suture of the wound after the fistula has been excised. The steps of the operation are as follow: the septum between the fistula and the bowel is divided; the entire fistulous channel and all lateral sinuses are excised; buried sutures of catgut, silk-worm gut, or of silk are then inserted beneath the wound and around its circumference at intervals of a quarter of an inch and tied so as to bring the deep tissues together. The sutures are inserted very much in the same manner as in the ordinary operation for ruptured perineum. The advantage of this plan is that primary union is secured and the patient recovers in a shorter time than would have been the case after one of the operations which aims to secure union by granulations. The wound now and then becomes infected, however, probably from its proximity to the bowel and its consequent liability to infection from the entrance of fecal matter. At all events, this complication has occurred so often in my experience that I would advise extreme caution when this procedure is employed, for if the presence of pus is not promptly recognized, the state of the patient is worse than prior to operation.

Literature of '97-'98-'99.

Case in which a broad-ligament flap was utilized to close the opening in the rectum in a case of fecal fistula. The ligament was detached from the uterus

down a sufficient distance to secure a free flap, and this was used to close the opening in the bowels and sutured fast with catgut. Incision was closed without drainage and recovery was uneventful. J. F. Baldwin (Med. Rec., Dec. 24, '98).

Ligature.—There are two methods of using the ligature, which we may term the immediate and the mediate. The immediate operation has little to commend it. It consists in passing a silk thread through the fistula and drawing it backward and forward so as to cause it to cut its way through. The same object may be accomplished by the use of the galvanic *écraseur* or of the wire *écraseur* of Chassaignac. In mediate operation by the liagture either the silk ligature or an elastic one may be employed. If the silk be employed, it may be used in one of two ways: In both methods a short piece of silk is threaded to a silver probe bent to a curve, which is passed through the fistula and drawn out at the anus. The thread is passed through the track so that one end hangs out of the bowel and the other at the external orifice of the fistula. It is at this point that the methods diverge. One plan consists in knotting the ends loosely together and allowing the patient to go about. After a time, ranging from two to four weeks, the ligature comes away, having slowly cut through the included tissues. According to Harrison Cripps, the pathological process by which this is accomplished appears to be a gradual destruction or disintegration of the included tissue, due to the ulcerative action of the thread. The other plan is to tie the silk so tightly that it will completely cut its way through and strangulate all the tissue requiring division in an ordinary case of fistula. This method causes considerable suffering to the patient and has therefore been discarded

in favor of the operation next to be described.

Elastic Ligature.—The advocates of the elastic ligature maintain that it does not give rise to hæmorrhage. This is a matter of considerable importance when the fistula penetrates deeply, and also in those rare cases of hæmorrhagic diathesis, in which severe bleeding is apt to follow a trivial incision. The elastic ligature, for which we are chiefly indebted to Dittel, of Vienna, causes strangulation by the firm pressure it constantly exerts upon the included structures; it cuts its way out in a week's time or less. It is stated, by those who have had an extended experience with this plan of treatment, that, contrary to what might be expected, the pain attending the ulceration of the band through the tissues is slight, especially after the first twelve hours. Consequently, this method would prove an excellent way of treating fistula if it were to be relied upon to effect a cure. Unfortunately, this is not the case, for it often happens that after the ligature has cut its way through, and the superficial parts have healed, the fistula remains uncured. The reason for this is to be found in the fact that the ligature has dealt with the main track only of a fistula in which exist one or more secondary channels or diverticula. It is, therefore, a measure to be resorted to only when there is an insuperable dread of any cutting operation; when the fistula is uncomplicated with branch sinuses; in cases of deep fistula in which there is danger of wounding large vessels; in cases in which the patients are debilitated by some chronic disease; and, finally, in patients of known hæmorrhagic tendency. It is a valuable adjunct to the use of the knife in dealing with cases in which a sinus runs for some dis-

tance along the bowel toward the superior pelvi-rectal space.

The method of employing the ligature is as follows: A solid India-rubber cord about one-tenth of an inch in diameter is threaded to a probe having at one end a rounded opening or eye through which the ligature is passed. The probe enters the fistula from the external to the internal opening, and passes out through the anus. To facilitate the passage of the cord, the rubber should be put on the stretch. After the ligature is passed a soft metallic ring is slipped over the two ends of the cord; the cord is then tightly stretched and the ring slipped up as high as possible and clamped. If the internal opening be any distance up the bowel, the instrument devised by the Allinghams facilitates the passage of the ligature. It is intended to draw the cord from the bowel out of the external orifice, and not *vice versâ*. Frequently by the time the cord separates the wound has become quite superficial.

AFTER-TREATMENT.—After the operation the wound should be packed with iodoform gauze and left undisturbed for twenty-four hours, to prevent subsequent hæmorrhage. A pad of gauze, over which carbolized oil is spread, and cotton and a T-bandage are next applied. The subsequent dressing of the case should be daily attended to by the surgeon himself. The parts should be kept perfectly clean, and the wound syringed with peroxide of hydrogen; carbolic-acid solution, 1 to 80; or a 2-per-cent. solution of creolin. After this a single piece of iodoform gauze laid between the cut surfaces of the wound will be all the dressing required. The healing process may be greatly retarded by excessive packing of the wound with lint, or delayed by the undue use of the probe. Such interference is to be avoided. If the granu-

lations be sluggish and the discharge be thin and serous, it will be well to apply some stimulating dressing such as resin cerate with 20 grains of iodoform to the ounce, or a weak solution of copper sulphate (2 grains to the ounce), etc.

The surgeon should be on the watch during the healing process to avoid any burrowing or the formation of fresh sinuses. Should the discharge from the surface of the wound suddenly become excessive it is evident that a sinus has formed, and a careful search should be made for it. Sometimes it begins under the edges of the wound, at other times at the upper or lower ends of the cut surface, and occasionally it seems to branch off from the base of the main fistula. Pain in or near the seat of the healing fistula is another symptom of burrowing; when complained of, the surgeon should carefully investigate its cause.

After an operation for fistula the patient's bowel should not be confined by the use of an opiate. The natural dread on the part of the patient, of experiencing pain, the result of a movement of the bowels, will be sufficient to inhibit any action, and the usual experience of the rectal surgeon is that a laxative will be required. The bowels should be moved on the third or fourth day. So soon as the patient feels a desire to go to stool an enema of linseed-oil (6 to 8 ounces) should be given, which will tend to render the fæces soft and fluid and hence render their passage easier. The patient should be kept in a recumbent posture until the fistula is healed; and until the bowels are moved the diet should be liquid: milk, beef-tea, and broths. The time required for a patient to recover after an operation for fistula in ano varies with the extent of the disease. In an average case it will be neces-

sary to keep the patient in bed for two or three weeks and confined to the house for several weeks longer. Many cases may be operated on in the office under local anæsthesia; such cases may get well without being confined to the house.

Much hæmorrhage rarely follows an operation for fistula, but in some cases it may be necessary to ligate a large vessel. If there should be a profuse general oozing, the sinus may be packed with iodoform gauze, or, if necessary, the rectum may be plugged; for this purpose the Allinghams tie a string into the centre of a large, bell-shaped sponge, which is passed into the bowel so as to prevent the blood from escaping upward into the colon. They then firmly pack the parts below with cotton dusted with powdered alum or persulphate of iron. In order to allow the escape of flatus, a catheter may be passed through the centre of the sponge. As a rule, all hæmorrhages following rectal operations are easily controlled by mild measures, such as the local application of hot water, of ice, or of some mild astringent.

Incontinence of fæces is happily of rare occurrence, and follows only extensive operations, especially those in which the sphincter has been divided more than once. When it exists to any extent, it is productive of great annoyance to the patient, possibly more so than the original fistula. The application of the small point of the Paquelin thermocautery to the cicatrix of the operation-wound will often suffice to relieve this trouble, by causing contraction of the anal outlet and giving tone and increased power to the sphincter-muscle. The Allinghams recommend for this condition freeing the ends of the muscle by a deep incision through the old cicatrix and allowing the wound once more to heal from the bottom by granulation.

Kelsey advocates complete excision of the cicatrix, exposing freely the divided ends of the sphincter and bringing them together by deep sutures, exactly as in cases of lacerated perineum.

Pruritus Ani.

Symptoms.—This may be classed among the most annoying of the minor affections. Though not painful nor dangerous to life, it may produce marked ill health by interfering with rest. The severity of the disorder varies considerably, ranging from irritation to intolerable itching. Usually the pruritus occurs at night after the patient retires, and lasts hours.

The itching may be so intense that it is almost impossible to avoid scratching, which, instead of giving relief, adds to the trouble. Nervous and excitable persons are prone to attacks of pruritus during the day as well as at night, especially after exercise or on leaving the cold air and coming into a warm room. In marked cases a characteristic condition is the loss of the natural pigment of the part. The skin is not supple, but has a peculiar harsh and rough feel similar to that of parchment-paper. It is frequently fissured from scratching.

Etiology.—The causes are both local and constitutional. In many cases it is impossible to discover any causative factor, and it may then be considered, as stated by the Allinghams, as a pure neurosis, occasioned or greatly aggravated by mental worry or overwork. Leucorrhœal discharge often excites pruritus by remaining in contact with the skin of the perineum and developing an eczema. In children, especially, it may result from the presence of *Oxyuris vermicularis* in the rectum. Pediculi, or scabies, may also occasion it, or it may be excited by improper diet and highly-seasoned food.

Hæmorrhoids, polypoid growths, fissure, or fistula, from the irritation they set up and the abnormal secretion they produce, and chronic diarrhœa or dysentery, may occasion pruritus. Erythema, herpes, and any variety of eczema, whether acute or chronic, may also give rise to it. It has also been traced to stricture and inflammation of the upper portion of the urethra. It frequently depends upon a varicose condition of the hæmorrhoidal veins, just as occurs in a similar condition of the veins of the lower extremity. Uterine disorder, uncleanliness, and insufficient ablution of the anus, and, finally, the use of hard or printed water-closet paper may excite it.

Literature of '97-'98-'99.

In cases of pruritus which do not yield to local applications and general treatment a careful search often revealed a simple ulcer. This lesion has been found to be the cause of intractable pruritus and in 25 per cent. of the cases, the ulcer being situated between the sphincters dorsally. It is usually small and superficial. F. C. Wallis (Clin. Jour., vol. xiii, No. 12).

Gouty subjects and persons with a more or less marked lithic-acid diathesis are predisposed to attacks of pruritus ani. Hepatic disorders, which may or may not be associated with constipation, diabetes, and chronic constipation, frequently act as causes, while excessive smoking and the free indulgence in alcoholic liquids or of coffee may also induce it. Excesses at the table, combined with a lack of proper exercise, not only predispose to pruritus, but also may become its exciting cause. It has also been ascribed to disease of the spinal cord and brain.

Treatment.—In the majority of instances, especially if there be no ascertainable local factor present, the affec-

tion must be treated by constitutional remedies as well as by local means. The Allinghams state that the difficulty experienced in its treatment has arisen in a great measure from its having been considered as merely a local affection, and only local means having been applied for its relief.

If the patient shows a lithæmic tendency he must be treated accordingly. Out-of-door exercise should be advised; the diet should be carefully regulated; meats should be taken in small quantities. Rich gravies, sauces, and pastry are to be avoided, as well as all sweets; malt liquors and all wines except claret are objectionable.

Literature of '97-'98-'99.

In one case of pruritus ani abstinence from claret (which was a favorite beverage with the patient) sufficed for a cure. In another case the omission of a pint of champagne every night at dinner was equally satisfactory. Cigarette-smoking is also a very potent factor in keeping up this condition. F. C. Wallis (Clin. Jour., vol. xiii, No. 12).

Turkish baths are beneficial when taken once or twice a week. Massage is also of advantage. Medicinally the lithium salts are indicated, either in the form of the natural mineral waters or the effervescing lithium-citrate tablet. In cases in which the irritation is very severe, the wine of colchicum, in doses of 5 to 20 minims, every four to six hours, answers best. Harrison Cripps recommends the following formula of Brodie's:—

R Magnesia, 6 grains.

Potassium bicarbonate, 15 grains.

Potassium tartrate, 10 grains.

M. Sig.: To be taken with water twice daily, three hours after meals. The second dose may be taken with advantage on going to bed.

This must be persevered in for at least ten days in order to properly test its efficiency.

The Allinghams found that when gout, active or latent, was the cause of pruritus ani, the irritation was best allayed by the local use of a strong solution of sodium bicarbonate or of sodium disulphite (1 drachm to the fluidounce of water) frequently applied in a poultice.

In functional derangement of the liver, if dependent upon a gouty diathesis, the diet should be carefully regulated. The use of alcohol should be restricted. Considerable benefit is to be derived from the use of aperient medicines, of which the salines are the best, as sodium phosphate or the sulphate or the natural mineral waters. In some cases marked improvement results from the use of mercury in some form, such as the fractional doses of calomel or blue mass in 5- or 10-grain doses. Ammonium chloride in 10- to 15-grain doses, four times daily, is a useful remedy in hepatic congestion. Nitrohydrochloric acid in combination with nux vomica and compound tincture of gentian or of cardamom often proves of value.

When chronic constipation is present the first step in correcting this condition is to instruct the patient to go at a certain hour every day to the closet, whether the desire exists or not. In most instances a morning hour will prove best, either before or after breakfast. Physical exercise is another important factor.

Certain articles of food are often of value, such as the fruits, of which apples, prunes, and oranges are the best.

No one plan can be outlined that will benefit all, or even the majority of persons afflicted with constipation. The individual indications are the only means by which we can successfully gauge the

remedies required. Some authorities are strongly opposed to the continual use of laxatives in cases of obstinate constipation, but without their employment some patients would never have a bowel movement. Many inordinately use cathartics and laxatives, but this fact offers no valid objection to their employment by the physician when other means have been fruitlessly tried. Sometimes a tumblerful of hot or cold water taken before breakfast will regulate the bowels. If this should fail, the mineral waters may be tried, especially the Hunyadi Janos, a wineglassful of which, followed by a half-tumblerful of hot water, may be taken. Fluid extract of cascara sagrada, with equal parts of glycerin, in doses of 30 to 60 drops at bed-time, will often prove useful. (See also CONSTIPATION, volume ii.)

In intractable cases of pruritus ani the urine should be examined for sugar.

The Allinghams state that when pruritus is of neurotic origin, as they think it frequently is, particularly in spare and delicate, excitable people, arsenic and quinine should be freely given, separately or combined. They should be pushed to their physiological effects. The internal use of opium in any form is contra-indicated. Most authorities agree that though a night's rest may be procured by its employment, its use aggravates the disorder.

LOCAL TREATMENT.—The pruritus induced by uterine catarrh can only be permanently removed by the cure of the prime factor in its causation. Relief from the itching can be afforded by cleanliness, frequent washing of the parts, and by the use of vaginal douches. Various sedative applications may be tried, such as 1 part of the officinal solution of plumbic subacetate to 4 parts of water, applied three or four times daily

by means of cotton pledgets; or a lotion composed of 1 ounce each of chloroform, tincture of aconite, and tincture of opium and 6 ounces of olive- or linseed-oil, which is to be shaken well before using and is to be smeared over the parts whenever the pruritus becomes annoying.

The elimination of *Oxyuris vermicularis* and the relief of any cutaneous inflammation about the anus which their presence has occasioned will materially assist the cure of the pruritus. To destroy the worms it is not sufficient to rely entirely on rectal medication, such as enemas of lime-water, weak solutions of quinine (20 grains to the pint of water), or of corrosive-sublimate solutions (1 part to 4000), for these only accomplish the destruction of the parasites in the rectum. In addition, it is essential for their complete eradication to add internal medication, so as to reach the seat of their propagation in the small intestine. (See PARASITES, INTESTINAL.)

When pruritus is caused by animal or vegetable parasites, it is readily cured by the application of the sulphur ointment, gently rubbed over the affected area at bed-time. The ointment should contain from $\frac{1}{2}$ to 1 drachm of sulphur to the ounce of benzoated lard, and it should be employed every night for a week or ten days. The use of strong sulphur ointment for any great length of time is injudicious, as the cutaneous surface of the parts is apt to become irritated. A cleaner and an equally efficient remedy advised by Messrs. Allingham is a lotion of sulphurous acid of the strength of 1 part to 6 of water.

The removal of hæmorrhoids, poly-poid growths, fistula, and fissure will enable remedies applied for the relief of a pruritus to affect a cure, when otherwise the disease will prove intractable. J. M.

Mathews ("Diseases of the Rectum," '92, pp. 494-97) alludes to a fact which is worthy of emphasis, viz.: that when pruritus is established, the treatment of any organ or local condition which caused the affection will not cure the pruritus.

The pruritus associated with varicose veins of the rectum may be relieved by measures calculated to tone up the part and to lessen any tendency to congestion. Bathing the anus night and morning and after a movement of the bowels will often accomplish this purpose. To prove efficacious a sponge must be soaked in cold water and squeezed dry by pressing it against the anus. This procedure must be repeated about a dozen and a half or more times at each bathing. Another excellent treatment is to use an injection into the bowel daily of about 2 drachms of the following formula:—

R Fluid extract of hamamelis, 1 fluidounce.

Fluid extract of ergot, 2 fluidrachms.

Fluid extract of hydrastis, 2 fluidrachms.

Compound tincture of benzoin, 2 fluidrachms.

Carbolized olive-oil or linseed-oil (oil, 5-per-cent. carbolic acid), 1 fluidounce.

M. Shake well before using.

Sig.: One to 2 drachms as an injection.

Pruritus Ani per se.—All discoverable local or constitutional causes of this disease having been excluded, we are brought to the consideration of a class of cases, by no means small in number, to which the term "neurotic" has been applied. That the condition is due to a neurosis, reflex or otherwise, is a little difficult to confirm, but it is a plausible explanation, and is a theory warmly ad-

vocated by Mathews. These cases often tax the physician's resources to their limit. What relieves one patient will utterly fail in another, and what gives relief for a time may lose its effect entirely. Furthermore, it is impossible to state, with any degree of precision, as to the form in which remedies should be used, for, as stated by the Allinghams, "in cases which appear best suited to ointments the ointments may utterly fail, and a powder which you feared would be utterly useless may effect a cure." Therefore they advise their readers "to ring the changes between ointments, lotions, powders, and caustics."

Hot water applied as hot as can be borne to the region of the anus, while it may temporarily increase the itching, acts as a temporary relief when employed at bed-time, provided the parts be not rubbed. It also paves the way for the application of other remedies, by making the parts more susceptible to their action.

Among the curative remedies recommended may be mentioned black wash, nitrate-of-mercury ointment, nitrate of silver in solution, chloroform, compound tincture of green soap, carbolic acid, calomel ointment, balsam of Peru, tincture of aconite and of belladonna (equal parts), camphor and carbolic acid (equal parts), menthol, and the hyposulphite of sodium.

Literature of '97-'98-'99.

The treatment which tends to the best results is a light breakfast, no luncheon, a good dinner, plenty of hot water an hour before and between meals, and correct habits. One method is conducive to the best results in all cases where no exciting cause or causes remain: that of stretching the rectum under anesthesia for from three to five minutes. After this, a sharp curette should remove

every vestige of the thickened and parchment-like membrane. Mathews (Dunglison's Col. and Clin. Rec., Aug., '98).

Prolapse of the Rectum.

The term "prolapsus," or "procidentia recti," signifies a protrusion through the anus of any part of the rectum, consisting of mucous membrane, either alone or combined with one or more of the coats of the bowel. Occasionally the protruded part contains within its folds a loop of the small intestine.

There are three forms of rectal prolapse: (1) prolapse of the mucous membrane alone [partial prolapse]; (2) prolapse of all the coats of the rectum [procidentia recti]; and (3) prolapse of the upper portion of the rectum into the lower, called invagination, or intussusception, in other parts of the intestinal tract.

Prolapse of the Mucous Membrane.—

In this variety the mucous membrane only is extruded, sliding away, as it were, from the muscular coat by the stretching of the loose submucous tissue which connects the two coats. The prolapse, in these cases, is necessarily limited, the protrusion being seldom more than an inch or two in length. This condition may occur at any age, though it usually occurs at the two extremes of life.

Symptoms.—The prolapse may be immediate as a result of vomiting, coughing, etc., or it may come on more gradually. The more the bowel is protruded, the more the parts become stretched and relaxed and favor the repetition of the descent of the rectum. When the attack comes on suddenly, there is apt to be considerable pain, and a tumor-like mass, red in color, projects from the anus. Frequently, blood is seen oozing from its surface. If the prolapse be of one that has often occurred, the mucous

membrane shows evidences of superficial catarrhal ulceration. In some instances the submucous inflammation causes the surface of the protrusion to appear perfectly smooth, but usually the mucous membrane appears as bright-red folds, with sulci between them, which radiate from the anal aperture. At first the protrusion only occurs at stool, and is readily reduced; in some cases it becomes spontaneously reduced. In chronic cases it becomes more difficult to replace, and may occur independent of fecal action. In these cases the mucous membrane is greatly thickened and the submucosa more or less infiltrated; a muco-purulent discharge is common, while bleeding, though slight, often occurs. The protrusion of internal hæmorrhoids is frequently associated with prolapse of the mucous membrane; this condition, however, ought always to be readily distinguished from the disease under consideration. Hæmorrhoids are more isolated and are much firmer to the touch.

COMPLETE PROLAPSE, OR PROCIDENTIA RECTI.—When partial prolapse has repeatedly occurred, it is apt to result in the more serious form, in which all of the tunics of the bowel are involved. In some instances an extensive prolapse takes place suddenly as a result of violent straining. In both conditions the tumor forms a protrusion of variable size, more or less pyramidal in form, which projects from the anus. At its distal end is the opening into the bowel, and this opening is generally narrow and slit-like.

When the prolapse involves more than two and a half inches of the rectum, it is well to remember that the peritoneum may be involved, and that within this serous sac and included in the prolapsed portion of the rectum a coil of the small intestine may be found. In this variety

there is no invagination. This form of prolapse may assume extensive proportions, the greater portion of the colon being extruded.

The symptoms of complete prolapse are similar to those in the first variety, but are usually more aggravated. Mucus is present, and even pus may be found when this condition is associated with ulceration. Pain, when present, is not usually severe, as the mucous membrane here seems to be purposely endowed with a lowered sensibility. This fact accounts for the considerable amount of trauma which the rectal mucous membrane stands without producing much suffering, as is exhibited in advanced and extensive malignant disease of the rectum. When the peritoneal coat of the intestine is involved, the sac of the hernia, so called, is to be looked for upon the anterior surface of the protrusion, as the peritoneal pouch does not descend nearly so far upon the posterior as upon the anterior wall of the rectum. Where the protrusion measures more than three inches, Ball states that the mass is generally curved, the concavity looking toward the coccyx, and in extreme cases it may be arranged in a more or less spiral manner.

PROLAPSE OF THE UPPER PORTION OF THE RECTUM INTO THE LOWER.—This disorder is called "invagination" or "intussusception" in other portions of the intestinal tract. It is described by J. M. Mathews as one "where the finger can be inserted into a groove alongside of the base of a tumor so that a distinct sulcus is recognized, of more or less depth, at the bottom of which, if not too deep, the lining membrane of the gut can be felt as it is reflected from the base of the protruding mass." In such a case the rectum has begun to fold upon itself; in other words, to become invaginated, or "telescoped," the upper part of the bowel

always passing within the lower, at a point more or less distant from the anus, yet generally within the reach of the finger. This subject has been considered in the article on OBSTRUCTION, INTESTINAL, volume v, and is mentioned here only for the sake of emphasizing the importance of recognizing the condition, especially as its treatment from a surgical stand-point differs materially from the operative procedures to be advised for the relief of the other two varieties of prolapse.

Diagnosis.—Though it is a comparatively simple matter to diagnose a prolapse, mistakes are frequently made. In children polypoid growths are more frequent than the literature would seem to indicate. In the adult hæmorrhoids may be mistaken for prolapse. Mathews suggests, in doubtful cases, that the adult patient be instructed to take an enema and to strain. If it be a prolapse of the mucous membrane, it will occupy the most or all of the circumference of the bowel, with a certain degree of regularity. The gut will be of a bright-red color, and if grasped between the fingers its folds can be easily pressed together, there being no well-formed tissue existing. In protruded hæmorrhoids the prolapse is irregular and does not include the circumference of the bowel, and oftentimes exists only on one side; and if the parts are seized a well-organized tumor can be felt, which can be circumscribed; the color is usually a dark blue. Another point to which Mathews directs attention is the size of the protruding mass. Simple prolapse is never very large, and where any of the coats of the rectum or all of its coats are included, the protrusion is much larger. A simple prolapse of the bowel does not usually remain out for any length of time, and a prolapse containing the coats of the rec-

tum is very apt to remain out an indefinite time, or until reduced.

Etiology.—Straining at stool is the most frequent exciting cause. Children are especially predisposed to prolapse, because the rectum is nearly vertical and the mesocolon is of considerable length. The unfortunate habit of placing a child upon a commode and leaving it there for a long time to establish regularity of habit is a rather common cause of prolapse. Stone in the bladder and phimosis, by the straining efforts produced at urination, are factors not to be overlooked in searching for the cause of this disease. It is often due to ascarides, to rectal polypi, and to violent fits of coughing, as in whooping-cough.

In adult life the causes of prolapse may be traced to some cause which leads to unnecessary straining efforts, such as enlarged prostate.

Prognosis.—When the mucous membrane alone is involved, a spontaneous cure is frequently effected; in children this result is more especially noticed. Mild measures often assist Nature. In the aged or in the young, where hypertrophy has occurred to any marked extent, operative measures are usually required to insure recovery. It is well not to promise too much to these patients as to the time necessary to effect a cure, as some cases respond but slowly to treatment.

Treatment.—No matter what variety of prolapse we are dealing with, efforts should be made to return the mass as speedily as possible. In some cases considerable difficulty may be experienced. Children should be laid across the knees and the entire mass should be subjected to gentle, but steady, pressure for some moments, so as to reduce the bulk of the tumor by the squeezing out of the fluid contents. The central portion should be

returned first; this is best accomplished by inserting the finger into the lumen of the gut; then, by pressure of the fingers of the other hand, the remaining portions of the bowel may be gradually pushed within the anus. Persistence in taxis will in nearly all cases suffice. In some cases artificial supports are needed. A belt may be placed around the waist and an elastic band, having a solid or inflated pad attached, is passed between the thighs in such a manner as to press the pad against the anus. The anterior part of the band is divided so as to come up to the belt in front of each side of the genitals. Another form consists of a belt, half steel and half leather, buckled about the hips just above the trochanters, while a bent steel spring passes down behind and carries a pad to press against the anus. In temporary cases, it assists the stability of the pad to draw the nates together with a broad strip of adhesive plaster. (Andrews.)

S. B. Powell recommends a plan which "consists in rolling in and strapping the buttocks together with two strips of adhesive plaster, extending sufficiently forward to secure a good hold. The child (or adult) defecates with these in position, is thoroughly cleansed after the act, and new strips are applied. This method, which, in the hands of the inventor, has never failed, is based upon the fact that the relaxed sphincter is elevated and supported during the strains put upon it while the child is at play, and is protected from the lateral traction occurring in the squatting position assumed in defecation. It and the parts above gradually regain their contractile power, and ultimately become competent to fulfill their functions normally." (Andrews.)

In all cases attention should be paid to regulating the actions of the bowels,

and, instead of permitting the patient to sit in the usual position, defecation should only be permitted either in the recumbent posture, lying upon the back or side, or while the patient is standing. It is also of assistance for the patient to become accustomed to having the movement of the bowels occur the last thing before retiring, so that rest may be obtained immediately thereafter.

If possible, the cause of the prolapse should be ascertained. A catarrhal condition of the rectum, a polypus, oxyurias, a phimosis, or a stone in the bladder should always receive the proper treatment before a satisfactory result can be obtained in dealing with the prolapsus.

Astringent applications for the relief of prolapsus are generally useless. Cold water applied to the anus, either with a sponge or as a douche, is as serviceable a remedy as any drug. The astringent remedies advised, in this connection, are: alum, tannin, sulphate or chloride of zinc, chloride of iron, etc.

Literature of '97-'98-'99.

In chronic prolapsus and the introduction of fragments of ice into the anus during the reduction of the prolapse has always been successful even in the gravest cases. The suppositories should be cone-shaped, artificially frozen, measure $2\frac{3}{4}$ to 3 inches in length, and in diameter at the base 1 to $1\frac{1}{4}$ inches. One of these is enveloped in a piece of iodoform gauze, which should cover it like a glove-finger, and is pushed into the centre of the prolapse, which can thus be readily reduced, the ice and gauze being carried up with the protruded bowel. Usually no painful sensation is produced and the tampon is not expelled. After each defecation a new gauze and ice tampon is introduced. The prolapse occurs more and more rarely, and soon ceases. This result is due to the relief of congestion and the increased contractility of the rectal tissues under the influence of the mechanical and

thermic excitation. Hajeck (Revue Men. des Mal. de l'Enf., Nov., '99).

Cauterization, either by the actual cautery or by the employment of the nitrate-of-silver stick is a very satisfactory method. Excision of elliptical strips of the mucous membrane is sometimes necessary and often suffices for effecting a cure. Hypodermic injections into the coats of the bowel is not to be advised. Vidal, quoted by the Andrews, has used ergotine, in this manner, with asserted success.

Literature of '97-'98-'99.

König's operation for prolapse of the rectum consists in narrowing the anal aperture. A wedge-shaped piece is removed from the edge of the anus, the elliptical incision being so made that one end lies within the anus and the other end on the outer skin. The excised wedge includes skin, mucous membrane, areolar tissue, and muscle. Care must be exercised in sewing up the deeper portions of the wound. Six cases were thus operated on and in two, after nine and three months, respectively, a slight return was noticed. In the others, up to the present time, no prolapse had occurred. C. Francke (Deut. Zeit. f. Chir., Mar., '99).

Non-malignant Ulceration.

It is a matter of surprise that erosions of the mucous membrane of the rectum are not more frequently produced and become the starting-points of ulceration, as a result of the irritation to which the bowel is exposed from the presence and passage of faecal matter. It is true that ulceration frequently exists and is not recognized; but, nevertheless, its frequency, compared with that of other rectal lesions, is extremely limited.

Symptoms. — Ulceration within the rectum, as a rule, occasions well-marked, though in no sense essentially pathognomonic, symptoms. The same signs are

often observed in cases of stricture of the rectum. The doubts as to the nature of the trouble may readily be cleared by making a digital examination. The symptoms noted are pain, tenesmus, diarrhoea (often alternating with spells of constipation), and discharge. These also suggest dysenteric attacks, and it is no unusual experience to see cases of ulceration treated for dysentery.

Cripps (*op. cit.*, p. 193) states that the degree of pain experienced is no indication of the severity of the disease, the suffering depending on the situation of the lesion rather than on its extent. Generally speaking, the nearer the anus it is situated, the greater the pain. This is well exemplified in cases of irritable ulcers of the anus. In ulceration involving the anus, loss of control of the sphincters often occurs.

The diagnosis will receive due attention when the individual varieties of ulceration will be discussed.

Etiology. — Non-malignant ulcers of the rectum are usually classified into (*a*) the varicose; (*b*) the traumatic; (*c*) the dysenteric; (*d*) the irritable [the so-called fissure of the anus]; (*e*) the catarrhal, or follicular; and (*f*) those arising from general debility occasioned by Bright's disease, phthisis, diabetes, and starvation; also into (*g*) the tuberculous; (*h*) the so-called rodent ulcer; (*i*) the chancreoid; and (*j*) the syphilitic.

The existence of the *varicose* and the *traumatic* varieties seems to be unquestioned by all authorities. It is true that varicose veins of the legs are often followed by ulceration, and that a similar condition of the hæmorrhoidal plexus of veins is the precursor of ulceration of the rectum, which should be classed in the category of the predisposing causes of all ulcerations in this region. In all conditions which lead to ulceration pri-

marily, the condition is attended by varicosity of the rectal vessels, which induces a stasis of the blood-supply, followed by congestion. Under these circumstances it is not likely that an ulcer of the bowel will occur without some form of traumatism.

The *traumatic* ulcer may be produced in a variety of ways, as from the introduction of foreign bodies through the anus; but much more frequently the initial laceration or abrasion is occasioned by hardened fecal masses, pieces of bone or wood, nut-shells, or some similar substance. Pressure of the fetal head during childbirth is a not unlikely cause. Retarded union following operative interference upon the rectum for the removal of hæmorrhoids, polypi, etc., is another factor in producing ulceration.

The *dysenteric* variety, in the opinion of J. M. Mathews, is rare. He states that "if a long-continued irritation is kept up in the rectum from any cause, the result would be, of course, an inflammatory exudate, resulting, perhaps, in ulceration and stricture," but he states that, in searching for this as a cause, the evidence has not been such as to enable him to place it in the list as a cause at all for stricture of the rectum. What this distinguished author has to say upon the subject of dysentery as a cause of rectal stricture applies with equal force to ulceration. An attack of dysentery may, and often does, act as a predisposing factor in causing an ulceration of the bowel, but that we have a class of ulcers to which we can apply the term dysenteric I very much doubt.

The *irritable ulcer* of the rectum, known more commonly by the term "fissure of the anus," has been thoroughly reviewed.

Follicular, or catarrhal, ulceration may,

according to Ball, occur in any part of the colon, but the seat of election is undoubtedly in the rectum and the sigmoid flexure. The solitary follicles become inflamed and disintegrated, and finally open upon the surface of the bowel, owing to the necrosis of the swollen tissue. Though small at first, these openings gradually enlarge, and small ulcers are formed, which do not tend to heal, but spread, and finally involve the submucous tissue. These ulcers also spread by uniting. In some instances the muscular coat of the bowel has been perforated and the ulceration has extended into the bladder and the vagina.

Ulceration involving the rectum and arising from the *general debility* occasioned by Bright's disease, diabetes, and starvation requires no special description, as it presents no special characteristics.

The true *tubercular ulceration* of the rectum may be a primary process, but in the majority of instances it is a secondary manifestation of pulmonary consumption. These ulcers are caused by the disintegration of small tuberculous nodules deposited in the mucous and the submucous coats of the bowel. They are sometimes scattered and sometimes closely packed together. Such ulcers are usually of considerable size and are found in the rectal ampulla or at the anus. They are irregular in outline, more or less ovoid, with their long axis parallel to the vertical axis of the bowel and corresponding to the direction in which the vessels in this locality run. They have a peculiar appearance, somewhat difficult to describe. They do not secrete pus, but a thin watery discharge, and are usually surrounded by a mucoid material.

Under the name of *lupoid ulceration* Ball describes the so-called rodent ulcer as one in which the essential element is

a chronic intractable form of ulceration in the neighborhood of the anus and genital organs. Cripps states that this disease is seldom met with in the rectum, and that few instances of its recurrence are on record. S. G. Gant has called attention to the fact that this variety of ulcer is frequently confused with cancer of the rectum and with tubercular ulceration, owing to the severe pain experienced, the amount of tissue destroyed, and its tendency to break out again and again, as well as its liability to increase in extent in spite of all treatment. Young and old persons are alike subject to it. The same authority states that this ulceration is not always rapid in its course, some patients living for years, while the disease slowly spreads and death finally ensues as the result of hæmorrhage or from a diarrhœa and its attending state of exhaustion. It is a superficial form of ulceration, and the character of the discharge is principally serous, containing but little pus.

The *chancroidal* form of ulcer of the rectum is rarely seen in this country. I have seen but one such case. Messrs. Andrews state that in the hospital of Saint-Lazare, in Paris, they were shown numerous cases of chancre of the rectum and the anus, caused by the practice of sodomy. These authors have also met with a few instances of this disease in cases of retrovaginal fistula in which the virus entered the rectum through the fistulous opening.

Regarding the *syphilitic* forms of ulceration of the rectum, it may be said that, in this country, at least, the only common manifestation is the mucous patch. It is my belief that the mucous patch exists more frequently within the rectum than is generally believed. In the late stages of syphilis a form of ulceration occurs in the rectum which

often assumes extensive proportions and results in the formation of stricture of the bowel.

Treatment.—In dealing with all cases of rectal ulceration rest is of primary importance, for the healing process will not take place if the patient be permitted to follow the usual habits of life. The medicinal treatment must be adapted to the nature of the lesion as well as to the relief of any general disturbance. In cases of simple ulceration the use of an enema of flaxseed-tea is of advantage in cleansing the bowel and to procure an evacuation. A pint or more may be used once or twice a day. An astringent injection may be employed, such as fluid extract of hydrastis, 1 to 2 tablespoonfuls to 6 or 8 ounces of water; a solution of nitrate of silver, 2 to 8 grains to the ounce. Insufflation of various powders may be used with benefit, such as iodoform, subiodide or subgallate of bismuth; calomel and the subnitrate of bismuth, equal parts, etc. In this condition I have found the following injection valuable:—

- R Fluid hydrastis, 2 drachms.
- Fluid extract of ergot, 2 drachms.
- Compound tincture of benzoin, 2 drachms.
- Fluid extract of hamamelis, 2 ounces.

M. Sig.: To be well shaken before using. One-half ounce at a time, to be injected into the rectum every day.

Pain can be allayed by the use of iodoform suppositories, 5 to 10 grains each, used every six to twelve hours. Opiates are injurious and sometimes dangerous.

No plan of treatment with which I am familiar will do much toward permanently curing the tubercular ulceration. Curettage and the application of iodoform have been used with temporary

success only. Similar results are given by most writers.

In syphilitic ulceration of the rectum we must depend upon mercury and the iodide of potassium. Antiseptic treatment of the local condition must be regularly and frequently carried out upon general principles observed in ulcerative processes elsewhere.

The body should be protected from undue exposure to cold and the diet should be carefully regulated. Stale bread, meat, milk, eggs, etc., may be used, but vegetables, as a rule, are to be avoided.

Congenital Malformations of the Rectum and the Anus.

The proportion of infants born with malformations of the lower portion of the intestinal tract is comparatively small. Harrison Cripps states that 1 case occurs in about every 4588 births. So far as published reports show, males form the larger percentage of cases.

Malformations of the rectum and anus result from arrested development of the so-called gut-tract during the early stages of foetal life.

The most practical classification for the use of the general practitioner is that of J. M. Mathews:—

Congenital malformations of the anus: (1) narrowing or partial occlusion, (2) total occlusion, and (3) complete absence.

Malformations of the rectum: (1) partial occlusion, (2) complete obliteration, (3) unnatural termination, (4) complete absence of the rectum, and (5) communication with the vagina.

The symptoms are self-evident in cases of malformations of either the rectum or the anus. In all the varieties—except that of the partial occlusion of the anus and in those somewhat rare cases in which the bowel opens into the vagina, urethra, or bladder, or in some abnormal,

but external, surface of the body—there will be signs of total obstruction of the bowels, such as distension of the abdomen and possibly faecal vomiting. (See also TUMORS OF THE RECTUM AND ANUS, in this volume.)

LEWIS H. ADLER,
Philadelphia.

RELAPSING FEVER. See SPECIFIC INFECTIOUS FEVERS.

RENAL SURGICAL DISEASES. See URINARY SYSTEM.

RESORCIN.—Resorcin (resorcinum, U. S. P.; meta-di-oxy-benzene) is a diatomic phenol obtained from benzene-meta-di-sulphonic acid by sodium hydrate with heat. It is also produced from different resins and from umbelliferous gum-resins on fusion with caustic potash. It is isomeric with pyrocatechin hydroquinone. It occurs in small, colorless, rhombic prisms, or plates, which turn reddish on exposure; is neutral in reaction; has a sweetish, unpleasant taste, and a peculiar, but faint, odor, which resembles that of carbolic acid.

Preparations and Dose.—It is soluble in alcohol (1 in 0.5), in water (1 in 0.6), in ether, and in glycerin, but very slightly soluble in chloroform or in carbon disulphide. The best vehicles for medicinal purposes are alcohol, glycerin, and syrup of orange. Resorcin has antipyretic, antiseptic, antispasmodic, anticonetic, analgesic, hæmostatic, and antizymotic properties. It is given in doses of from 2 to 30 grains, several times a day. Maximum single dose is 45 grains; maximum daily dose is 150 grains.

Poisoning by Resorcin.—In large doses (60 grains) resorcin causes a lowering of the temperature (which persists for two or three hours), nausea, oppression, languor, salivation, and profuse sweating.

In larger doses it is followed by cerebral symptoms, such as giddiness, tingling, deafness, confused vision, tremor, clonic convulsions, and unconsciousness; the tongue is dry, the teeth clenched, the pupils normal, the temperature low, and the urine black (hæmoglobinuria). Death occurs from respiratory and cardiac paralysis. Death has occurred in children from lavage of the stomach with a 3-per-cent. solution. Schwabe recently reported a case in a child in which 15 grains in an enema produced alarming symptoms. In the adult recovery has followed the ingestion of 2 drachms.

Treatment of Poisoning by Resorcin.—Evacuation and lavage of the stomach are indicated. The administration of albumin, diffusible stimulants, and diuretics may be supplemented by the application of external warmth to the trunk and extremities. The use of atropine, strychnine, or ether hypodermically and of amyl-nitrite by inhalation or internally will counteract the paralyzing effect of resorcin upon the heart and the respiration. Red wine has been suggested as being useful in these cases.

Therapeutics. — **GASTRO-INTESTINAL DISORDERS.** — Resorcin has been employed in doses of from 1 to 2 $\frac{1}{2}$ grains, in solution or powder, repeated every hour or two, for the relief of vomiting and seasickness. In similar doses it has been found of value in dyspepsia, chronic gastric catarrh, diarrhoea, cholera nostras, cholera morbus, and in enteritis. It is also serviceable in the diarrhoea of children (enterocolitis or cholera infantum). It relieves pain and checks hæmorrhage from gastric ulcers. Gastralgia is relieved by this remedy. W. H. Thomson, of New York, suggests the following formula for this class of cases: Resorcin, 2 drachms; tincture of orange-peel, glycerin, and syrup of ginger, of each, $\frac{1}{2}$

ounce; peppermint-water, sufficient to make 6 ounces. Of this a dessertspoonful in a wineglassful of water is taken after meals. If preferred, 2 to 4 grains may be given in pill or capsules before each meal, in cases of gastric ulcer, as suggested by Hare, who attributes the beneficial action to the analgesic, antiseptic, and hæmostatic powers of resorcin.

LEUCOPLAKIA.—In leucoplakia Leistikow advises: Resorcin, 6 parts; siliceous earth, 3 parts; lard, 1 part; this to be spread over the patches several times daily, especially after eating and before going to bed. After eight to fourteen days the opaline patches shrink and the mucous membrane becomes thin, rosy, and very sensitive. The mouth may be rinsed frequently with peppermint-water to which borax has been added. To overcome the hyperæmia caused by the resorcin, applications of balsam of Peru are useful.

FEVERS.—Resorcin in doses of from 30 to 60 grains has been used as an antipyretic, but it is not serviceable, as, in addition to the untoward symptoms produced by these large doses, it has little power in strong fevers. It has been used, however, locally and internally in erysipelas, puerperal fever, and septicæmia with marked benefit.

RESPIRATORY DISORDERS. — Resorcin has been used in pertussis and hay fever, in the form of a spray from a 2-per-cent. solution and internally in doses of 10 drops of the same solution. Moncorvo, who introduced this method of treatment for whooping-cough, applies the solution, by means of a wire-handled throat-brush, to the perilaryngeal mucous membrane, every two or three hours during the day. In hay fever the spray-solution has been made as strong as 20 per cent. In a 2-per-cent. solution, it is a beneficial application to tuberculous lesions of the

larynx, and in purulent and ulcerative affections of the throat and nose; in the nose the solution should not be stronger than 1 per cent. In diphtheria resorcin is a valuable topical remedy. In asthma and emphysema resorcin has been given in doses of from 5 to 15 grains.

CUTANEOUS DISORDERS.—Resorcin has been used topically in skin affections of a subacute or chronic character, in solution or ointment varying in strength from 1 to 10 per cent. or more. It should be borne in mind that weak solutions (1 to 3 per cent.) harden the skin, while stronger ones (10 to 50 per cent.) macerate and destroy it.

Literature of '97-'98-'99.

Following methods of using resorcin in alopecia recommended:—

R Resorcin, 1½ grains.
Quinine hydrochlorate, 3 grains.
Pure vaselin, 1 ounce.

This is to be applied to that part of the scalp which is devoid of hair, or from which the hair is rapidly falling. Should this preparation produce much irritation of the scalp, an ointment composed of 20 grains of borax to 100 of vaselin should be applied. Brocq (*Practitioner*; *Phila. Med. Jour.*, Apr. 22, '99).

Resorcin has been used with good effect in eczema with much induration and in psoriasis, for both of which the following formula may be used: Resorcin, oxide of zinc, of each, 1 drachm; rose-water ointment, 10 drachms. After mixing the ointment, heat it until the resorcin crystals melt, to prevent irritation of the skin; to be applied locally twice daily.

In erythematous eczema resorcin in weak solution may be used to allay the itching; a solution of 10 or 15 grains to the ounce of water, a little salt being added to aid in its absorption by the skin.

should be dabbed, not rubbed, on the parts, or the following may be used: Resorcin, 15 grains; glycerin, 10 minims; lime-water, 1 ounce; mix and use as the preceding (Hare).

In the abortive treatment of herpes Leloir employs the following solutions: Resorcin, 30 grains; hydrochlorate of cocaine, 8 to 30 grains; tannic acid, 90 grains; alcohol (90 per cent.), 3 ounces; mix and apply locally. Or: Resorcin, 30 grains; hydrochlorate of cocaine, 15 grains; extract of cannabis Indica, 2½ drachms; spirit of peppermint, 2½ drachms; alcohol (90 per cent.), 2 ounces. Mix.

In acne rosacea, Petrini obtained good results from the application of the following, after the pustules had been opened: Resorcin, 15 grains; ichthyol, 30 grains; flexile collodion, 1 ounce. Mix.

In ringworm of the scalp and other parasitic disorders Julius Andeer used resorcin-soap (5 to 10 per cent.).

In the desquamative stage of scarlatina Jamieson used a resorcin-salicylic superfatted soap. In a series of cases washing the skin with this soap and warm water shortened the period of desquamation by two weeks.

For seborrhœic eczema Eddowes recommends: Resorcin, ½ to 1 drachm; glycerin, 10 to 20 minims; vinegar of cantharides, 3 drachms; sweet-almond oil, 4 drachms; cologne spirits, 1 ounce; alcohol, 3 to 5 ounces; water, sufficient to make 8 ounces. This mixture forms a pleasant local application and relieves the itching.

Literature of '97-'98-'99.

The beneficial influence of resorcin is most markedly apparent in eczemas, especially eczema seborrhœicum; when resorcin is combined with alcohol, in the proportion of 2 drachms to 4 fluidounces, respectively, and applied thoroughly to the scalp by means of a dropper, the cure

of this troublesome scalp affection will be thorough and satisfactory. C. H. Powell (Merck's Archives, Nov., '99).

In the treatment of extensive patches of *tinea versicolor* E. Bodin employs the following ointment: Resorcin and salicylic acid, of each, 15 grains; precipitated sulphur, 75 grains; lanolin, vaselin, and suet, of each, 6 drachms. Make up into an ointment.

In slowly-spreading epithelioma of the face Hartzell recommends the following plaster: Resorcin, 72 grains; yellow wax and powdered resin, 1 1/2 drachms; olive-oil, a sufficient quantity to make a plaster. Mario Luciani reports 2 cases of this disease cured by the following: Resorcin, 2 1/2 drachms; petrolatum, 1 ounce. To be applied once a day to the ulcerated surface after previously cleansing with a 2-per-cent. solution of borax.

In chilblains C. Boeck advises the use of the following: Resorcin, ichthyol, and tannin, of each, 30 parts; water, 150 parts; this is to be shaken well and applied to the unbroken skin every night; it cannot be used when the skin is broken or the surface ulcerated.

The following solution will not blacken the hands: Resorcin, 60 parts; gum arabic, 38 parts; water, 115 parts; tale, 15 parts; apply every night; less efficacious than the preceding one, but may be employed if the patient's work is such that he cannot use a substance which blackens his hands.

In chancroids, painful ulcers, and suppurating and sloughing wounds resorcin may be used externally in solution or ointment (1 to 10 per cent.) in injection or spray. Absorbent cotton and gauze may be medicated with resorcin for surgical dressings.

CATARRHAL DISORDERS.—Resorcin in a 1- to 2-per-cent. solution is used in spray for various catarrhal disorders.

In acute and chronic conjunctivitis and wounds of the cornea resorcin solution (1- to 2-per-cent.) is of service. This solution may be used as an injection in urethritis, cystitis, vaginitis, and purulent otitis. In powder combined with boric acid (5 to 10 per cent.), it is very efficient in the treatment of discharges from the ear; the ear should be thoroughly cleansed with a solution of boric or carbolic acid, and dried, and the powder insufflated into the canal.

In aphthæ, stomatitis, and thrush, a 1- or 2-per-cent. watery solution of resorcin is an efficient application.

Derivatives and Allied Compounds.—**RESORCIN-EUCALYPTOL.**—This substance occurs as a white, crystalline powder, which is soluble in alcohol and has antiseptic properties. It is used externally as a dressing for wounds, ulcers, and skin diseases, in ointment or alcoholic solution.

RESORCIN-SALOL.—This is a combination of resorcin and phenyl-salicylate possessing antiseptic properties. It is used in the treatment of intestinal inflammations, diarrhœa, dysentery, typhoid fever, rheumatism, etc. The dose is from 3 to 9 grains.

RESORCINOL.—This is not simple resorcin, which is also called by this name, but is obtained by melting equal parts of resorcin and iodoform. It occurs as an amorphous, brown powder having the odor of iodine and the taste of iodoform. It is an antiseptic and parasiticide, and is used externally as a surgical dressing for wounds, chancroids, ulcers, etc., and for the treatment of scabies, psoriasis, eczema, erysipelas, and other skin diseases. It is applied as a dusting-powder (20 to 50 per cent.) with starch or in ointment (7 to 15 per cent.) with lard.

RESORCIN-PHTHALEIN (FLUORESCIN, OR DIRESORCIN-PHTHALEIN).—This sub-

stance is obtained from phthalic anhydride by heat with resorcin to viscosity. It occurs as an orange-red, crystalline powder, soluble in ether, alkaline solutions, dilute acids, boiling alcohol, etc. It is used for the diagnosis of corneal lesions, and impervious strictures of the nasal duct, in solution of 10 grains to the ounce of water, 15 grains of bicarbonate of soda being added to perfect the solution. When this aqueous solution is dropped upon the cornea, those parts, however small, which are deprived of their epithelium are colored green, while foreign bodies are surrounded by a green ring (Straub). The solution is red by transmitted light, by reflected light it exhibits a beautiful green fluorescence.

RESORCIN-PHTHALIN, or fluorescein, is obtained from fluorescein by heating with sodium hydrate and zinc-dust. It occurs as a bright-yellow powder, which readily oxidizes into fluorescein.

RESOPYRIN is a reaction-product from mixing aqueous solutions of resorcin and antipyrine in molecular proportions. It occurs as a white, opaque mass, or as a white powder, soluble in alcohol, ether, and chloroform. It is antipyretic, analgesic, and antiseptic. It is used in all febrile and painful conditions where antipyrine and resorcin are indicated. The dose is from 5 to 10 grains.

QUINOLINE-RESORCIN occurs as a gray, crystalline powder. It is antiseptic and antipyretic in its action. Clinical data are wanting.

THIO-RESORCIN is a reaction-product from heating resorcin with sulphur. It occurs as a yellowish-gray, tasteless, non-irritating powder, possessed of a penetrating odor (Merck), insoluble in water, and but sparingly soluble in alcohol and in ether. It is used as an iodoform substitute in leg-ulcers, as a dusting-

powder, or in a 5-per-cent. ointment (Guttman); its application appears to be followed, sometimes, by unpleasant symptoms (Amon), though these may be traceable to admixture of resorcin.

HYDROQUINONE (hydrochinone, quinol, or para-di-oxy-benzene) is obtained from aniline by oxidation with chromic acid, mixture, and reduction of the quinone formed by sulphurous acid. It is also a product of the splitting-up of arbutin by hydrolysis. It occurs in long, colorless, dimorphous, sweet crystals (sometimes grayish white in color—Merck), which are soluble in alcohol, in ether, and in 17 parts of water. It is an antiseptic and antipyretic. It has been used externally in solution (1 to 3 per cent.) for conjunctivitis, gonorrhœa, etc., and for the treatment of infectious fevers, rheumatism, etc., in doses of from 5 to 15 grains. Maximum single dose is 30 grains.

PYROCATECHIN (pyrocatechuic acid, catechol, or ortho-di-oxy-benzene) is isomeric with resorcin and hydroquinone. It exists in nature, but is usually prepared from guaiacol. It occurs in colorless scales or needles, soluble in water, alcohol, ether, chloroform, benzene (benzol), and hot toluol. Its aqueous solution reduces silver salts in the cold and Fehling's solution on warming; if the solutions are made alkaline they absorb oxygen rapidly and change to green and finally to black. It has antiseptic and antipyretic properties. It has been used as an antipyretic, but has bad after-effects (Brieger, Masing). It is used externally in solutions and ointment as a dressing for wounds, burns, injuries, etc. It is more powerfully antiseptic than carbolic acid, resorcin, or hydroquinone.

C. SUMNER WITHERSTONE,

Philadelphia.

RESPIRATORY ORGANS; NEUROSES OF.**Sensory Nasal Neuroses.—ANOSMIA.**

—Loss of the sense of smell is infrequently observed, though its impairment through any local disorder is quite frequent. Mechanical obstruction of the nasal cavities by growths, especially nasal polypi, prevents ascent of the odoriferous particles to the olfactory areas; inflammatory disorders of the nasal mucous membrane, acute or chronic, by causing infiltration of the tissues environing the olfactory fibrils, impair their sensitiveness and thus give rise to anosmia. Cerebral diseases of various kinds, cerebral tumors, locomotor ataxia, syphilis, lead poisoning, malaria, the excessive use of tobacco, the prolonged use of snuff, the prolonged inhalation of irritating fumes, etc., may be mentioned as among the many etiological factors of this disorder. The duration depends upon the cause; cases due to nasal growths usually recover their sense of smell soon after removal of the neoplasm, even though the latter may have been present a long time. Anosmia due to central disorders follows the course of the latter.

Treatment.—Measures calculated to remove the causative factor are obviously indicated. Cases due to syphilis often promptly yield to iodide of potassium. When strychnine can be used in gradually increasing doses it is often of benefit. Galvanism, the positive pole being covered with a moist cotton pledget and applied to the olfactory region, may be used simultaneously. The negative pole should be applied between the eyes and the electrode thoroughly moistened to insure penetration.

PAROSMIA, OR PAROSPHERESIS—Disordered or perverted sense of smell, the patient complaining that foul, peculiar, or pleasant odors, putrid flesh, burning

rags, urine, musk, etc., is a symptom occasionally observed in acute or chronic catarrhal disorders of the nasal cavities, syphilis of the nose, and of cerebral tumors when these directly or indirectly involve the olfactory bulb. It frequently accompanies various neuroses,—hysteria, epilepsy, insanity, neurasthenia, and locomotor ataxia especially,—and is sometimes observed during pregnancy, the menopause, and uterine disorders.

Treatment.—Here also the cause must be ascertained and removed. Mere cleansing of the nasal cavities twice a day with a lukewarm boric-acid solution (1 drachm to the pint of water) is often sufficient to cure the disorder when due to catarrhal congestion. Syphilitic parosmia quickly yields to specific treatment; but when it is due to cerebral tumors it follows the course of the latter.

HYPEROSMIA.—Abnormal sensitiveness of the sense of smell is rarely observed, and is usually associated with hysteria, neurasthenia, hypochondria, menopause, and other conditions in which the nervous system is in a state of temporary or permanent adynamia. It sometimes occurs as an excessive physiological development, the sense of olfaction resembling that observed in some lower animals, especially dogs.

SPASMODIC SNEEZING.—This represents but a manifestation of a physiological function repeated frequently or continuing beyond the usual limits. It may be caused by an hyperæsthetic state of the pituitary membrane coupled with the presence of foreign particles capable, by their shape, of keeping up a titillation of the epithelial surfaces. It may be caused reflexly through the eyes, by sunshine, pregnancy, etc. I have witnessed two cases in which the menopause appeared to be the main etiological factor. The condition appears to me to be due to

a temporary adynamia of the reflex centres. This is sustained by the fact that tonics and stimulants are usually beneficial.

Treatment.—To arrest a paroxysm, Koch recommends firm pressure upon the hard palate with the thumb, exerted before the close of the deep inspiration that precedes sneezing. In many cases, however, the palliative measures indicated below, under HYPERÆSTHETIC RHINITIS, must be resorted to. The application of chromic acid to the mucous membrane is an effective remedy when the condition has assumed chronicity. The acid may be applied melted by heat to the end of a flat probe, once a week, six or seven times.

Hyperæsthetic Rhinitis (Hay Fever; Rose Cold).

Symptoms.—The early symptoms of an attack of hay fever vary; in some cases there appear, one or two weeks before the access, a mild coryza, heaviness about the brow, general malaise, chilly sensations, itching at the roof of the mouth and eyes; but these manifestations do not always present themselves, the attack of hay fever beginning suddenly at precise dates,—August 10th for hay fever, May 10th for “rose cold,”—in the majority of cases. The disease occurs twice in the year in some individuals, but the great majority only suffer from one attack a year. “Rose cold” is somewhat shorter in duration than hay fever, which usually lasts about six weeks. Subjects of the disease can usually point to the exact day, and sometimes the hour of the expected attack.

The access usually begins with a sensation of itching in the nostrils, which soon becomes very intense, and causes violent and prolonged sneezing. A prickling, burning sensation in the inner canthi, followed by profuse lachrymation,

may accompany this symptom, or constitute the first evidence of the attack. Very soon the nose becomes occluded through intumescence of its lining membrane, and respiration through it is practically impossible. A watery discharge appears, which soon becomes very profuse, and its strongly alkaline character causes it to irritate the nostrils and the upper lip, sufficiently sometimes to give rise to painful excoriations. Violent sneezing may begin at once, or occur when the watery discharge begins to trickle down along the intranasal walls, and the patient makes futile efforts, by immoderate use of the handkerchief, to clear the nose of the cause of obstruction and irritation. Chilly sensations, frontal headache, tinnitus aurium, loss of smell and taste, violent itching at the roof of the mouth, pain over the bridge of the nose, facial pruritus, and general symptoms, such as slight pyrexia, urticaria, disordered stomach, and flatulence, are among the possible accompaniments of this stage.

As the affection progresses, the nasal secretion assumes more of a mucoid character, becoming at times muco-purulent. The conjunctiva may become greatly inflamed, and photophobia and marked chemosis follow, rendering, in some cases, a prolonged stay in a dark room necessary. Asthma may occur as a complication of the affection, or as its only symptom. It may present itself any time during the course of the disease; it manifests itself suddenly as soon as the irritating agent is inhaled. In the majority of cases, however, it begins a few days after the primary nasal symptoms have shown themselves, and as soon as these become marked.

Etiology and Pathology.—As at present interpreted, the morbid factors lying behind this disorder are: (a) an organic

disorder of the nasal mucosa, (*b*) general nervous debility, and (*c*) an external irritant, the bloom of rag-weed, the pollen of flowers, dust, etc. In a certain proportion of cases cure of the nasal disorder, especially when nasal polypi, septal spurs, etc., are removed, prevents a return of hay fever; in others, removal to a country or district in which the irritating factor is not present also prevents the access. Two of the causative elements are thus demonstrable. The neurotic factor (abnormal excitability of the sympathetic system, according to John N. Mackenzie) may also be clearly traced in a large proportion of cases, while the family history often shows the presence of the disease in parents or near relatives. The periodicity of the disease is accounted for by the periodical appearance in the air of certain pollens. Thus, an individual whose nervous system is susceptible through general adynamia, and whose nasal mucous membrane is hyperæsthetic through a local lesion, develops an attack of hay fever or rose cold only when the pollen to which he may be susceptible is present in the air he breathes. This special susceptibility to one or more substances—pollens, etc.—is comparable to that presented by many persons in respect to various drugs: belladonna, opium, etc.

[I do not regard hay fever in its active form as a disease *per se*, but merely as the symptom-complex of a sudden cessation of the inhibitory functions of the nerve-centres presiding over the physiological processes of the upper respiratory tract. These nerve-centres, under the influence of hereditary or acquired disease of an adynamic type, having themselves become adynamic, are able to carry on their functions under ordinary circumstances; but, when demand is imposed upon them for inordinate functional activity, they lose all power of control, and give rise to the symptoms observed after section of the

spheno-palatine ganglion, or of the cervical sympathetic, as shown by Claude Bernard, most marked of which symptoms is hyperæsthesia. Hence the name "hyperæsthetic rhinitis," submitted by me some years ago in lieu of the absurd term "hay fever."

Habit and psychical impressions, as is usually the case in neurotic disorders of an adynamic type, may play, in an especially sensitive individual, an active part in the production and cessation of the symptoms.

The central regions affected I believe to be mainly the gray substance of the bulb, which represents the prolongation of the posterior horn. The transit involves the spheno-palatine ganglion, which, besides its motor and sensory roots, possesses a sympathetic root derived from the carotid plexus through the vidian. The presence of asthma as a complication indicates the implication of a greater central field than that affected when the nose alone is the seat of paroxysm. This appears to me to account for the presence of asthma only in a proportion of the cases.

The main predisposing influences are, in my opinion, the diseases of childhood and disorders inherited or acquired, tending to induce adynamia: *i.e.*, a lowered, cellular activity, affecting mainly the nerve-centres alluded to. The *arthritisme* of the French, and the gouty or uric-acid diathesis (Bishop), being but results of deficient cellular activity, merely represent, from my stand-point, a single—though important—class of factors among the many that are capable of promoting the vulnerability of the nervous centres previously weakened through acquired or inherited adynamia. Hay fever would practically be a universal disease were an excess of uric acid in the blood its only or even its main cause. CHARLES E. DE M. SAJOURS.]

Hay fever is most frequently met with among brain-workers, professional men, clergymen, lawyers, merchants, etc. It may occur at any age, and seems to prevail with more frequency in men than women.

Treatment.—Careful examination of the nasal cavities and removal of any abnormal condition that may be present is of primary importance. Indeed, cases in which polypi, spurs, hypertrophies, etc., are found and removed often yield the most satisfactory results. Appropriate surgical treatment seems, in some cases, to relieve the hyperæsthesia of the mucosa and, by eliminating one of the three causative factors, to arrest the disease. In some cases, repeated cauterization with glacial acetic acid of any unduly sensitive spot found in the intranasal tissues, especially the middle turbinated bone, by gently passing a probe over them, prevents the attack if the applications are made twice a week within the month preceding it. Galvanocautery and chromic acid tend to give rise to cicatricial induration and local dryness, if applied over broad areas, and therefore less valuable than glacial acetic acid.

The medicinal treatment indicated may be divided into two parts: that tending to counteract the nervous adynamia and that aiming to arrest the active symptoms. Strychnine in gradually increasing doses fulfills the first indication, atropine the second. I have found the following measures productive of excellent results when begun three months before the expected attack. The patient is given $\frac{1}{60}$ grain of strychnine during meals one week; after this, the dose is gradually increased until $\frac{1}{20}$ grain is taken three times a day. This dose should be reached by the second month and be continued throughout the latter and up to two weeks prior to the expected attack. The purpose of the strychnine is mainly to stimulate metabolism. The elimination of products of waste should then be encouraged by the administration of salicylate of sodium, 10 grains three times a day, large quan-

ties of lithia-water being given simultaneously.

On the day the paroxysm is expected a granule of atropine, $\frac{1}{120}$ grain, is taken on rising and repeated in the evening if necessary. One granule daily is usually sufficient to prevent the attack if the nasal cavities are sprayed several times a day with a solution of menthol in albolene, 5 grains to the ounce. Cocaine was at one time extensively used in these cases, but it is a pernicious drug, by causing secondary local paresis and subsequent aggravation of the symptoms. The measures for the asthmatic manifestations do not differ from those indicated in the classical form (see *ASTHMA*, vol. i).

Hay fever is due to an excess of uric acid in the blood. As a preventive, the salicylate or the phosphate of sodium is given for about forty days before the expected attack. Galvanocautery is employed when indicated by local organic lesions. Seth S. Bishop (*Jour. Amer. Med. Assoc.*, Nov. 25, '93).

Inhalations of the ordinary cologne-water produce marked sedative effect during paroxysms, a few whiffs being sufficient at times to arrest the intense pruritus. Mollière (*Lyon Méd.*, Jan. 21, '95).

In hay fever the following plan of treatment is successful: Valerianate-of-zinc pills, 3 grains in each; one pill to be taken three times a day after meals; to be commenced a full month before the onset of the attack is expected, and to be continued for at least a month after the usual time of onset. Abercrombie (*Brit. Med. Jour.*, Apr. 18, '96).

Literature of '97-'98-'99.

The habits of the patient, both as to food and exercise, should be regulated with the greatest care. With restoration of the digestive tract, the general nutrition established upon a firm foundation, and the previously unstable nervous system steadied and invigorated, the patient is enabled to resist such disturbing influences as once proceeded from the contact of atmospheric irritants with

the hyperæsthetic pituitary membrane.
C. P. Grayson (Ther. Gaz., Oct. 15, '97).

Nasal Reflex Neuroses.—These are usually ascribed to an impulse starting from the termination of a nerve of nasal mucous membrane through the intermediary of a sympathetic centre and giving rise to morbid phenomena at a point more or less distant from the nose. Epilepsy, neuralgia, facial spasm, etc., have thus been traced to nasal disease. Whether the peripheral nerve-filaments, the nerve-trunk, their ganglia, or the entire system is at fault is hardly determinable.

Reflex disturbances of the eyes are frequently observed as a result of hypertrophic rhinitis, atrophic rhinitis, polypi, etc. Cases of ciliary neurosis were cured by Seifert by division of nasal synechiæ. The connection between the nose and the eye mainly depends upon the nasal branch of the ophthalmic division of the fifth nerve. Cutaneous disorders are sometimes ascribable to nasal disorders, especially, according to Wells, the group known as the angioneuroses, including urticaria, herpes, pemphigus, erythema, etc.

Sensory Pharyngeal Neuroses.

ANÆSTHESIA occurs as a symptom of various disorders in which the general nutrition is impaired, especially anæmia and phthisis, and of cerebral disorders: apoplexy, general paralysis, tumors, etc. Some drugs—the bromides—induce sufficient anæsthesia of the pharynx to facilitate local operations in this region. Certain neuroses—epilepsy, hysteria, and chorea—are also attended by more or less pharyngeal anæsthesia.

HYPERÆSTHESIA.—Hyperæsthesia is usually observed in individuals whose pharynges are kept in a congested state through unhygienic habits, local disease, etc. Thus, drunkards almost invariably

have very sensitive pharynges, while tonsillitis and pharyngitis, and certain gastric and hepatic disorders tend to cause hyperæsthesia through engorgement of the vascular system, etc. Pharyngitis sicca is frequently attended by marked hyperæsthesia.

PARÆSTHESIA.—Abnormal sensations in the pharynx, heat, cold, the presence of a foreign body, enlargement, "tickling," and particularly the painful sensation that a scratch produces are commonly observed. While occasionally these subjective symptoms represent but hallucinations of sensation, a cause can usually be detected when a sufficiently careful search is instituted. A sensation suggesting the presence of a foreign body, for instance, is frequently due to an almost imperceptible laceration or abrasion of the mucous membrane caused by a spicule of bone, a small piece of crust, a seed, etc. Inflammatory tonsillar disorders of almost any kind may also act as etiological factors; the lingual tonsils or mass of lymphoid tissue at the base of the tongue when enlarged being especially active in this particular. Among the general diseases capable of acting as sources of this disorder are the menopause, the rheumatic and gouty diatheses, hysteria, and neurasthenia; among the local causes, elongation of the uvula, naso-pharyngeal catarrh, and pharyngitis sicca.

Treatment.—In all these manifestations the cause should be sought after and corrected and the pharyngeal surfaces treated according to the character of the lesion noted (see TONSILS AND PHARYNX).

Paralysis of the Pharynx.—**ETIOLOGY.**—Paralysis of the pharynx is usually caused by diphtheria, or syphilis, or cerebral affections implicating the nerves which supply the pharynx. It is some-

times caused by local inflammation, especially when this is membranous. The paralysis may be limited to one constrictor muscle, or involve them all; it is an occasional complication of hemiplegia. It frequently occurs as a precursor of death in febrile diseases, especially typhus and pneumonia.

SYMPTOMS.—Besides nasal speech, there is difficulty of deglutition, great effort being required to force the food down the œsophagus. Liquids are generally swallowed with less difficulty, but their frequent passage into the larynx, especially when the epiglottis is also paralyzed, renders their use dangerous. When the soft palate is involved, the food may be forced into the posterior nasal cavity, through the efforts of the tongue to assist deglutition. The accumulation of mucus on the pharyngeal wall is very troublesome.

TREATMENT.—Besides treatment of the central cause, strychnine hypodermically and general tonics are almost always indicated. Arsenic is especially valuable when the affection is a sequel to diphtheria. Electricity serves the double purpose of assisting in the diagnosis and restoring motion. When the paralysis is of central origin, an interrupted current will cause contraction of the muscles, but this contraction will not occur if atrophy of the muscles is the principal pathological element of the case: the cure will then be rendered much more difficult, if at all possible. Therapeutically, electricity should be applied with both electrodes over the muscles for about ten minutes every other day.

Laryngismus Stridulus, or Spasmodic Laryngitis.—This is an affection of poorly-nourished or weak children in which dyspnoea, caused by spasmodic closure of the laryngeal aperture, suddenly occurs.

SYMPTOMS.—The attacks usually come on at night while the child is asleep. Awaking suddenly, the patient gasps for breath and shows every evidence of prompt suffocation without cough or hoarseness. The pulse becomes weak, cold sweats and cyanosis soon come on, and in a few moments the child may be at death's door. Often, however, after a few gasps, a quantity of air is suddenly drawn into the lungs with a "crowing" sound, the respiration becomes more normal, and in a few minutes the child seems out of danger. This improvement is sometimes ephemeral, however, and the attack may return after a few minutes or hours, and continue several succeeding days and nights. The number of deaths, in a series of one hundred and sixty-four cases collected by Loos (*Archiv f. Kinderh.*, B. 21, H. 5 and 6) amounted to fourteen.

Literature of '97-'98-'99.

Four cases of an hitherto-undescribed form of laryngitis stridula characterized by inspiratory dyspnoea protracted for several weeks, but there were no paroxysmal attacks such as are the principal feature of the ordinary form. J. Comby (*Archives de Méd. des Enfants*, Jan., '98).

ETIOLOGY.—There being no inflammation of the larynx, the term "laryngitis" is not applicable, a spasmodic or nervous element alone prevailing, which, according to Escherich, is closely allied to tetany. It occurs about equally in children of both sexes, and may be caused by a nervous shock or excitement such as occurs when children are severely punished or even scolded. It occurs mainly in children who have soft bones and cartilages, flabby muscles, and general weakness; hence rachitis is considered as the main pathogenic factor in the vast majority of cases. The pressure of enlarged bronchial glands upon the vagus, adenoid

vegetations, and hypertrophied tonsils seem to bear a close association with the disease. Gastro-intestinal disorders and exposure to cold and damp also represent common causes of this disorder.

In 144 cases of laryngismus stridulus 79 were boys and 65 were girls. In 55 the disease appeared at the age of from 1 to 6 months, in 55 from 6 to 12 months, and in 34 after the first year. Stage (Bibl. for Laeger, p. 251, '94).

In 100 cases of laryngismus stridulus—52 girls and 48 boys—94 showed positive signs of rachitis, 3 were free from this disease, and in 3 the diagnosis was uncertain. Sixty-two were between the ages of 6 and 18 months when the disease developed. Bull (*Archiv f. Kinderh.*, B. 18, H. 1 and 2, '94).

Case in which laryngismus stridulus followed a bullet wound in the arm. J. W. Irwin (*Med. and Surg. Reporter*, Jan. 27, '94).

Two cases of laryngismus stridulus in which the spasm was due to the reflex irritation or impacted feces in the colon. M. Zancudo (*Med. Press and Circ.*, May 30, '94).

TREATMENT.—Measures calculated to meet the danger of suffocation, leaving the determination of its true nature until all immediate danger has been eliminated, are first indicated. A warm mustard foot-bath or a general bath usually serves its purpose very rapidly; sometimes cloths wrung out of cold water placed over the thyroid are sufficient. Of value is the production of emesis, either by titillating the back of the mouth with a feather or administering ipecac. The triturate tablets of the latter drug are recommended by Northrup, four or five of the $\frac{1}{100}$ -grain tablets being given every ten to thirty minutes until four or five have been taken, are specially valuable for this purpose. A few whiffs of chloroform or ether sometimes act favorably at once. The possibility of impaction of the epiglottis is to be remembered

as a causative element, and, should it be found free, no harm will follow the introduction of the finger, which, in case of impaction, would have raised it without difficulty. The application of a sinapism to the liver tends to prevent recurrence of the attacks. The bromides, chloral, opium, belladonna, etc., also act advantageously. Morphine injections sometimes cut the attack short in a few moments.

When all means fail to re-establish normal respiration and the dyspnoea continues marked, intubation should be practiced. If instruments be not at hand to perform the operation, the trachea must be opened or a catheter introduced into the larynx to temporize until intubation instruments can be obtained.

Motor Laryngeal Neuroses.

Adductor and Tensor Paralysis.—The main varieties of adductor paralysis—*i.e.*, paralysis of the muscles which close the glottis—are: paralysis of the adductors or lateral cricoarytenoids; paralysis of the internal tensors of the vocal cords or internal thyroarytenoid muscles, and paralysis of the interarytenoid muscle.

PARALYSIS OF THE LATERAL CRICO-ARYTENOID MUSCLES.—This variety of paralysis is that generally termed "hysterical aphonia," owing to its prevalence among the female sex and the association it so often presents with disorders peculiar to them, neurotic and uterine. It usually comes on suddenly, the aphonia being generally total, including even, sometimes, the power to whisper. Some cases are able to sing, however, and the voice may also appear during laughter, sneezing, coughing, etc.; indeed, in every act involving vocal resonance, except talking. The vocal cords upon laryngoscopic examination are wide apart and fail to approximate when the patient is told to sound her voice, the formation of

sound-waves being impossible. The mucosa in true cases of hysterical aphonia is pale. It is usually due to a shock or fright; sometimes no external cause can be found. There is, as a rule, a history of previous attacks.

Treatment.—In true hysterical aphonia the voice may return as suddenly as it disappeared without treatment. But therapeutic measures are required in the majority of cases, since prolonged paresis of the muscles is liable to promote their atrophy. The cases should be carefully examined and any abnormal condition corrected. Strychnine is always indicated. The voice can usually be brought back, by local applications of electricity, one pole, using Mackenzie's electrode, being inserted behind the larynx and the other, the negative pole, externally over the thyroid cartilage. A weak current is sufficient—indeed, at times, no current at all—to cure a case, the psychical effect being the main factor.

PARALYSIS OF THE INTERNAL THYROIDARYTENOID MUSCLES.—This form of laryngeal paralysis is usually manifested by hoarseness or low-pitched huskiness. The paralyzed muscles being tensors of the vocal cords, their mobility, as far as adduction and abduction are concerned, is practically unimpaired. When, therefore, the patient is asked to phonate while the laryngoscopical mirror is in position, the cords usually come together in the normal way, but, tension failing to simultaneously occur, an elliptical space remains between the margins of the cords. The coarse vibrations induced give rise to the characteristic voice. Paralysis of the internal thyroarytenoids may accompany various neuroses, especially neurasthenia. Local disorders, of a congestive kind, or excessive use of the voice are comparatively frequent causes of this variety of paralysis, which is, however,

usually associated with other local motor lesions.

Treatment.—Total rest of the voice, faradization, increasing doses of strychnine, and massage of the anterior cervical region represent the indications for these cases, which, as a rule, readily yield to appropriate treatment.

PARALYSIS OF THE INTERARYTENOID MUSCLE.—This muscle is seldom paralyzed alone. Its position from side to side in the posterior wall of the larynx enables it to cause approximation of the neighboring portion of the cords about one-fourth of their length. When, therefore, it is paralyzed, only the anterior three-fourths of the cords are adducted, the posterior fourth remaining abducted and open. In the mirror a triangular gap may be discerned. As a result, vocal resonance is almost entirely prevented and aphonia is usually complete, or a peculiar whistling tone is given to whatever voice may remain. It is usually caused by prolonged catarrhal inflammation involving the interarytenoid space, and hysteria.

Treatment.—The treatment does not differ from that of other forms of paralysis. Any catarrhal condition that may be present should, of course, receive careful attention.

Abductor Paralysis.

UNILATERAL PARALYSIS OF THE POSTERIOR CRICOARYTENOID MUSCLES.—The vocal cords being separated or abducted by the cricoarytenoid muscles, paralysis of one of the latter causes the corresponding cord to remain adducted,—i.e., in the middle line or slightly beyond,—while the other cord acts normally, during phonation. The irregular triangular space forming the glottic aperture is sufficient for normal breathing, however, in the majority of cases; dyspnoea, therefore, is infrequently com-

plained of, except under great exertion. The voice is seldom impaired, the only alteration being a certain degree of coarseness, especially marked after continued use of the voice. Examined laryngoscopically, the cord on the affected side will be seen to remain in the fixed position mentioned during inspiration.

BILATERAL PARALYSIS OF THE POSTERIOR CRICOARYTENOID MUSCLES.—When both muscles are paralyzed, we have a dangerous form to contend with, inspiration being almost prevented by the permanently adducted cords. The dyspnoea is especially marked during inspiration; the cords being pressed downward and closer together by the air-pressure above them, through the suction induced below by the expansion of the chest. A whistling sound is heard, as the air rushes through the small aperture left open through relaxation of the arytenoids. During expiration, the air forced up the trachea separates the cords, owing to the inclined plane of the infraglottic tissues. Though the voice is practically normal, the continuous dyspnoea to which these patients are subjected is very distressing, and their continuous efforts to inhale after a few words have been uttered and the whistling noise produced gives the condition a character which is not soon forgotten. Slight congestion of the tissues sometimes so increases the likelihood of asphyxia that intubation or tracheotomy is at once necessary.

ETIOLOGY AND PATHOLOGY OF ABDUCTOR PARALYSIS.—Paralysis of the abductors is frequently produced by pressure upon one or both vagi or their recurrent branches, by various growths of the neck and thorax, goitre, œsophageal cancer, etc. The left recurrent—curving, as it does, around the aorta—is particularly exposed to the pressure of

aneurisms in this situation, causing unilateral paralysis. The motor nerves of the vagus being all derived from the spinal accessory, any growth of the brain involving the origin of the latter or the vagus itself may also give rise to abductor paralysis. Bulbar lesions, amyotrophic lateral sclerosis, and locomotor ataxia may be mentioned as among the neuroses most frequently complicated in this manner; while typhoid fever, syphilis, lead poisoning, etc., may also give rise to abductor paralysis through involvement of the nervous supply in the general toxæmia. Again, the situation of the posterior, cricoarytenoids outside and behind the larynx proper causes them to be greatly exposed, not only to involvement in neighboring inflammatory processes, but also to the mechanical effects of foreign bodies, hot liquids, or corrosives that may be swallowed.

TREATMENT OF ABDUCTOR PARALYSIS.—The likelihood of cure corresponds with the degree of amenability to treatment of the original cause. Whether it be syphilis, tuberculosis, aneurism, a cerebral neoplasm, etc., local treatment is absolutely subservient to that of the primary affection, and the treatment of the latter is therefore the first indication.

Measures must be adopted to stimulate the laryngeal muscles to action. Faradization is the most effective agent at our disposal. The laryngeal electrode (Morell Mackenzie's) is used as follows: The electrode being connected with the negative pole of a faradic battery, its extremity is introduced into the larynx, while the positive pole is connected with an ordinary surface electrode which the patient presses over the larynx externally, or with a necklet electrode. The extremities of both electrodes should be covered with sponge or kid, to prevent stinging. To insure penetration of the current the

electrode-tip should be thoroughly wetted before each operation. The manipulation of Mackenzie's electrode is like that of an ordinary laryngeal forceps, the mirror being employed to note and conduct the localization of the tip of the instrument. The nearer the paralyzed muscle the application, the better. The electrode being in position, the finger-rest on the top of the handle is depressed, and firm pressure is exerted on the neck by the other electrode. At first this manipulation is quite difficult to perform, gagging and retching preventing the introduction of the instrument. After a few trials, however, the parts become more tolerant, and the application can be borne, in the majority of cases, without trouble. Cocaine anæsthesia may be used in difficult cases, at least the first few times. Each application of the current should last but a few seconds, and be repeated several times at short intervals. One sitting every day should be obtained if possible.

The current may also be applied by placing one pole on each side of the neck externally. This method is very inferior to that just described. Better than it is electrical massage, which is carried out by placing the positive pole, thoroughly wetted, on one side of the larynx, and the fingers of the opposite hand (that holding the negative pole and in contact with the sponge) on the other side. The fingers, having become the conductors, are moved up and down and pressed into the surface of the neck, in the manner practiced by *masseurs*. They must also be kept wet by occasional immersion in water.

Strychnine, nux vomica, and other nerve-tonics should be used, if possible, to assist the electrical stimulus. Strychnine is especially valuable, either by the mouth or hypodermically, beginning with $\frac{1}{60}$ grain at a dose, three times a day,

and gradually increasing until $\frac{1}{20}$ grain is reached. This dose cannot be taken by all patients, however, and the physiological effects of the drug should therefore carefully be watched.

CHARLES E. DE M. SAJOUS,
Philadelphia.

RESPIRATORY PASSAGES, FOREIGN BODIES IN.

Foreign Bodies in the Nasal Cavities.

Foreign bodies of various kinds may be introduced into the nasal cavities, or concretions may form therein and give rise to the symptoms occasioned by foreign bodies. Again, living organisms—flies or their ova, maggots, leeches, etc.—may enter the anterior nares and cause stenosis, accompanied by symptoms varying with the nature of the offending structure.

Symptoms.—The symptoms may be subdivided into three classes: (1) those attending the presence of inanimate foreign substances; (2) those caused by concretions formed in the nares: rhinoliths or nasal calculi; and (3) those due to the entrance of living structures: flies, their ova, etc.

Various substances—such as buttons, pebbles, coins, fruit-stones, beans, and other dense bodies—may at first give rise to no active manifestations. In the majority of instances there is more or less profuse sero-mucous exudation, followed, if the foreign body causes pressure, by a muco-purulent discharge. The fact that this is unilateral serves to differentiate it from a purely catarrhal disorder in children. The affected side of the nose sometimes projects more than the other. This may occur early, when organic bodies such as peas, beans, etc., are present. These may even germinate *in situ*. When a history of the penetration of a foreign body cannot be ob-

tained, examination with the probe usually establishes the diagnosis. In adults the only conditions with which confusion could arise are malignant or semimalignant tumors, which are very rare; and syphilis and tuberculosis, diathetic diseases presenting other characteristic symptoms.

Concretions formed in the nares, also termed nasal calculi or rhinoliths, generally start with an inorganic body as a nucleus, but they may occur without these, through accretion of salts derived from the nasal mucus. Whichever way they originate, they steadily become larger through deposition on their surfaces of these salts,—the phosphate of lime and magnesia, chloride of lime, carbonate of lime, etc.—and may attain, though very gradually, sufficiently large size to completely occlude the narium affected. Besides the symptoms caused by inorganic bodies, there may be severe pain, due to pressure and repeated attacks of epistaxis. The diagnostic features do not differ from those of the form just described, but the probe can usually elicit by the “ring” or grating-sensation conveyed to the hand the character of the occluding substance.

When *living organisms*—flies, maggots, etc.—are present, all the symptoms enumerated occur, but they are supplemented by others that become very severe in advanced cases. If living insects that may have invaded the cavities fully grown, or have developed from ova, are present, they may feed upon the living tissues themselves, causing ulcerative processes. These may not only involve the mucous membrane and the underlying bone, but the inflammation may extend to the meninges and bring on a fatal issue. Severe pain radiating in various directions, formication; a nauseating, purulent, bloody discharge; fre-

quent attacks of epistaxis, and swelling of the facial tissues are the most evident symptoms present.

Treatment.—Removal is obviously indicated, but this is not always easily accomplished, especially when the foreign body is imbedded in the tissues or surrounded by adventitious material, salts, etc. The local use of a 10-per-cent. solution of cocaine greatly facilitates examination with the probe, and under a good light the character of the trouble can usually be determined and the offending substance withdrawn. The flat end of a probe when curved flatwise is efficient for this purpose when it is possible to pass the hooked end either beneath or over the foreign substance. Small polypus-forceps sometimes suffice. Loose bodies can often be ejected by the use of Politzer's bag in the opposite nostril or by means of sternutatories.

When solidly impacted, the foreign body may have to be crushed by means of a pair of solid forceps or drilled or sawed through. These operations are dangerous, however, unless performed by an expert rhinologist. The foreign body may sometimes be pushed back into the naso-pharynx and removed with the post-nasal forceps, but care must be taken not to lacerate the Eustachian promontory.

Foreign Bodies in the Pharynx.—This subject has been in part reviewed in the article on the ŒSOPHAGUS (volume v), the majority of foreign bodies which enter the pharynx being, in reality, impacted in the upper portion of the former, either behind the larynx or on either side of the latter, in one of the pyriform sinuses, or above the epiglottis. When, therefore, foreign bodies of the pharynx are spoken of and the limits of this cavity are properly established, the scope

of the subject becomes restricted. Indeed, unless it be a sharp object capable of sufficiently lacerating the upright posterior pharyngeal wall to hold on to it, a foreign body will either pass below to the œsophagus as stated, or into the larynx, or lodge behind one of the pillars or into the tonsils. Strictly speaking, the latter are the seat of almost all foreign bodies which can be said to have become impacted in the pharynx. These are almost always sharp objects, fish-bones, tacks, pins, etc.,—capable of easily penetrating the tonsillar crypts or between the pillars, or in the recess behind the posterior pillar.

Foreign bodies are often referred to as still present in the pharynx when, in reality, they have passed downward. This is usually due to the presence of a minute abrasion or scratch produced by the foreign body on its way downward. Again, hysterical subjects seem to present a predilection for pharyngeal foreign bodies, and in the majority of cases of this kind a foreign body has not been swallowed at all.

Foreign Bodies in the Larynx.—The foreign bodies that may become engaged in the larynx may be said to represent almost anything that may be introduced into the mouth. A large mass of meat totally beyond the dimensions of the cavity may dip one of its extremities into the latter, and cause fatal dyspnœa by acting as a stopper, or it may become jammed between the pharyngeal wall and the end of the epiglottis, and thus also cause immediate asphyxia. Tooth-plates, among the larger objects, are also frequent intruders in this region. Those which most frequently become lodged there, however, are principally articles of diet,—bones, bread-crusts, fish-bones, etc.,—which are drawn into the air-passages during a fit of laughter. just as the

act of deglutition is being performed. Their penetration into the air-tract depends greatly upon their size, small objects being frequently drawn into the trachea, while large objects remain in the upper part of the cavity.

Symptoms.—Immediate and violent retching, or coughing if the passage is not entirely occluded, follows entrance into the larynx of any object: a reflex act calculated to dislodge it. Sometimes this succeeds, the foreign body is coughed up and out, and the patient recovers at once, although his throat may remain painful for several days. When the foreign body is large enough to fill the laryngeal cavity sufficiently to occlude it, and the first expulsive effort does not succeed, the patient, having comparatively emptied his lungs of air, finds it impossible to inhale; he makes desperate efforts to draw air into his lungs, each effort causing the offending object to impact itself more tightly in the glottis. In the great majority of cases, however, the object is of such a shape and form that sufficient air is permitted to enter the lungs to keep the patient alive. In this case, the first paroxysm, although severe, subsides; violent paroxysms of coughing follow, and, after a few minutes, comparative comfort is enjoyed until another coughing spell brings on dyspnœa and a renewal of the first symptoms. After a time, the larynx seems to become accustomed to its new occupant, and a small object may even be forgotten and ejected in a fit of sneezing or coughing long after. In many cases, however, such is not the case, and organic lesions may be caused which may endanger the patient's life. The inflammation occasionally extends to the lungs, and a fatal result may be caused by pneumonia. Again, notwithstanding the spontaneous expulsion of a foreign body, secondary

inflammation may follow and endanger the patient by œdema of the larynx. Under such circumstances, the patient at once experiences the preliminary stages of asphyxia; he gasps for breath and unless assistance be at once provided may die in a few moments. This is only apt to occur, however, when a mass totally occluding the larynx, such as a piece of dough or meat, becomes impacted.

Treatment.—The simplest means are sometimes sufficient to dislodge an impacted body. A violent slap on the back, just as an expulsive effort is being performed by the patient, often succeeds. At times, the object remains over the aperture and can easily be removed with the finger. As we have seen under the heading of FOREIGN BODIES IN THE PHARYNX, the epiglottis may be held down by the impacted body so as to completely close the laryngeal aperture; the finger can also be used in this case.

When the foreign body presents a certain degree of weight, such as a piece of coin, a bullet, etc., an effort may be made to cause its fall from the larynx by inverting the body, the patient standing on his hands while his feet are held up; or he may be placed, face downward, on a table, one end of which is then raised as high as possible.

Pins and needles, tacks, and bones—*i.e.*, objects having a tendency to penetrate into the tissues when efforts at expulsion are made which cause them to increase their hold—can be withdrawn by means of forceps with the assistance of the laryngeal mirror. Before cocaine was introduced, this was an exceedingly difficult procedure. The larynx, through the pressure of the foreign body, became much more sensitive than usual, and the mirror could hardly be borne, let alone the forceps. In the midst of the retching and gagging, which occurred in most

cases, the forceps had to be introduced, and advantage taken of an effort at inspiration to seize the object and draw it out. With cocaine, however, the operation is greatly simplified; a 10-per-cent. solution applied generously to the laryngeal membrane and all the parts around the larynx, including the epiglottis and the base of the tongue, so anæsthetizes the throat as to render the extraction of the foreign body a comparatively easy task. Any laryngeal forceps may be employed to grasp small objects, while Fauvel's, Mackenzie's, or Cuzco's may be used for large ones.

When the foreign body cannot be reached and suffocation is threatened, tracheotomy is the only resort, and should be performed. If the necessary instruments are not at hand, the trachea may be opened with a penknife and the wound kept patulous with carefully cleansed hair-pins the curved ends of which are bent into hooks. The sharp ends being also bent into hooks in the opposite direction, thus forming an S, the pins are secured by means of a piece of tape passed around the patient's neck. Or the thyrocricoid membrane may be divided, thus furnishing a sufficient opening for the admission of air until more decided measures can be adopted. Before doing this, however, it is advisable to ascertain as nearly as possible the location of the foreign body, to avoid making an unnecessary opening in case it should have fallen into the trachea. The location of the foreign body may often be ascertained by auscultation, a whistling noise being audible at the point of impaction; a stethoscope may be used for the neck.

Tracheotomy is occasionally performed to enable a foreign body impacted in the trachea to be coughed out. The opening made in the windpipe should be longer than for the introduction of the cannula:

one inch and a quarter for an adult and about one inch for a child. The spontaneous extrusion of the foreign body is thus greatly facilitated.

Cocaine can be used to great advantage for the mechanical removal of foreign bodies located in the trachea, and especially in either bronchi, through a tracheal opening. For the removal of an object located above the wound, thorough anæsthesia of the larynx from above, and also from below, by means of a small atomizer with a curved tip, using a 10-per-cent. solution, permits the introduction of a small mirror into the trachea, through the wound, without provoking cough. A probe, curved upward, is then passed in, and the foreign body pushed up into and out of the larynx. The operation can thus be conducted in the safest possible manner, and be accomplished much more rapidly. A foreign body impacted in one of the bronchi can sometimes be seen by introducing the mirror with its face downward; the anæsthetic having been carefully applied, its exact location, shape, and surroundings can be ascertained, and a suitable forceps employed for its extraction.

CHARLES E. DE M. SAJOUS,
Philadelphia.

RETINA AND OPTIC NERVE, DISEASES OF. See OPTIC NERVE AND RETINA.

RHEUMATISM.—From Gr., *ῥευμα*, fluid.

Definition.—A disease, probably of parasitic origin, characterized by pain, swelling of the joints and of the muscles, and which may be acute or chronic.

Acute rheumatism of the joints, or rheumatic fever, is a febrile, migratory, disease, liable to complicating inflamma-

tions of the pericardium and of other visceral serous membranes, and to recurrences.

Acute Rheumatism, or Rheumatic Fever.

Symptoms.—Rheumatic fever rarely presents marked prodromal symptoms, but ordinarily the patient feels weary and sick for from one to three days. The symptoms of the acute disease then set in suddenly with chills, which may be repeated once or twice; fever appears and the temperature rises to 39° or 40° C. (102° to 104° F.); the pulse and respiration are accelerated, the tongue furred; there is no appetite, but thirst. The urine is scarce and loaded with urates, which give it a dark-red color and rapidly precipitate; the specific gravity of the urine is high, and it is not rare to observe albuminuria the first days of a rheumatic fever. Chemical examination demonstrates that urea as well as uric acid are present in excessive quantity. Hæmoglobinuria, peptonuria, urobilinuria, and cystinuria have sometimes been observed.

The skin is covered with abundant perspiration and numerous miliaria alba or rubra often appear on it. Simultaneously with the fever the characteristic signs of rheumatic arthritis appear, generally in the articulations of the foot or the knee. Frequently the affection begins in the articulation talo-cruralis, and after some days the process also invades the knees, the shoulder, the elbow-joint, and the hands.

Otitis media is often a prodrome of acute articular rheumatism. The bacteriologist in searching for the microbe of polyarthritis should examine the secretions taken from the drum-cavity immediately after paracentesis of the membrane has been performed in a case of acute rheumatic otitis media. O. Wolf (Arch. f. Ohrenh., Dec., '96).

The affection occasionally begins in the articulations of the arms. When this is the case it ordinarily occurs in persons occupied in hard, bodily work; the larger joints are most frequently affected, but also the small joints of the fingers and of the toes. A single joint rarely continues to be the seat of trouble for more than four or five days; the affection then suddenly disappears, commonly during the night, and one or more other articulations are attacked in turn. In very severe cases almost all articulations may be affected simultaneously and even the joints of the jaws, the spine, and the ribs may be painful and swollen. Ordinarily rheumatic fever attacks several articulations, but monarticular acute rheumatism has also been observed.

Monarticular rheumatism observed in thirty-eight cases out of a total of fifty-one recorded in the polyclinic at Greifswald, which indicates that rheumatic disease confined to a single joint is not so rare as it is generally supposed to be. Heidenhain (*Inter. klin. Rund.*, Aug. 18, '95).

According to statistics, the localization of the disease in the different joints is as follows: Foot, 27.8 per cent.; knee, 17.9 per cent.; hand, 9.6 per cent.; shoulder, 6.2 per cent.; hip, 4.1 per cent.; metatarsus, 3.7 per cent.; elbow, 2.2 per cent.; metacarpus, 1.2 per cent.; toes, 0.8 per cent.; fingers, 0.8 per cent.

The affected joints are very painful, swollen; the overlying skin is red, hot, tense, and cedematous, while pressure upon it leaves an impression which remains visible for some time. Swelling of the joint is principally caused by the cedema of the skin and of the ligaments, but occasionally also by an effusion in the articulation itself. By moving the diseased articulation a crackling sound is sometimes heard; this is commonly caused by the inflammatory changes of

the tendons and their synovial membranes. Moving and even touching the affected joints is very painful to the patient; in severe cases the pain may be occasioned by very small commotions, such as is caused by walking over the floor of the sick-room. The pain seems to be localized in the tendons and the muscles in the proximity of the articulation, and, when it is possible to induce the patient to keep completely quiet, slight movements of the diseased joint may be passively executed without causing any pain, whereas the most trifling active movement is accompanied by excruciating pain.

The skin over the affected articulation shows increased sensibility to changes of temperature, but a diminished sensibility to faradic irritation.

The temperature of the patient is raised in proportion to the number of the affected articulations; in uncomplicated cases it seldom rises above 39° to 40° C. (102.2° to 104° F.), but it may also oscillate between 38° and 39° C. (100.4° to 102.2° F.).

The duration of rheumatic fever varies from some days to several weeks or even months; it is liable to remissions and exacerbations, and especially when the patient leaves the bed or the sick-room too soon exacerbations are frequently observed. In some cases the fever declines, but one or more articulations remain swollen and painful for a long time; a critical decline of the temperature is rarely observed.

When the swelling of the articulations subsides the cuticle commonly cracks and peels off in small scales. As many red corpuscles of the blood perish during a severe attack of rheumatic fever, the patients get pale and weary, and the anæmia often continues for a long time after the recovery from the disease itself.

Series of eighty examinations in twenty cases of acute rheumatism. In every case of acute rheumatism examined there was a distinct increase of white corpuscles, although there was never any extreme degree of leucocytosis. The highest number observed was nearly 20,000 white corpuscles per cubic millimetre, the number in healthy blood being between 6000 and 7000. The rapid increase of white corpuscles commenced very early in the rheumatic attacks, and declined equally rapidly in the convalescence, keeping closely parallel with the diminution and replacement of the red corpuscles, but apparently more influenced by the degree of febrile heat. Garrod (*Brit. Med. Jour.*, May 28, '92).

Some authors have mentioned a larvated kind of acute rheumatism, characterized by neuralgia accompanied by high fever, as, for instance, of the trigeminus or ischiatic, but without involvement of the joints and yielding rapidly to the use of salicylates. During an epidemic of rheumatic fever sometimes endocarditis or pericarditis with high fever is observed in patients who do not suffer from any affection of the articulations; such cases have been denominated "polyarthriti^s rheumatica sine arthritide."

Literature of '97-'98-'99.

A little-noticed symptom of acute rheumatism is a sharp pain in some nerve-trunk or region supplied by the arborizations of a single nerve. This affection of the nerve-trunk usually runs along parallel to the rheumatism, at times being but little noted, yet at others becoming more noticeable. It is evidently a sort of metastatic perineuritis set up by the same agents which have produced the rheumatism. F. Steiner (*Deutsches Archiv f. klin. Med.*, 58. p. 237, '98).

Complications.—These are very frequent and affect especially the heart and the nervous system. Endocarditis verucosa and even ulcerosa is observed in

a large proportion of cases and especially when the fever is high and many joints are affected. Pericarditis is not quite so frequently observed; endocarditis occurs in about 20 per cent. of all cases, pericarditis in about 14 per cent., but these proportions vary, the epidemics of rheumatic fever differing very much in regard to severity and frequency of complications.

In almost all cases some dilatation of the right heart is found and a febrile murmur is heard over the heart, but these signs are not necessarily due to endocarditis, and may be caused by the high fever. In consequence of the endocarditis the muscles of the heart may also be affected either by simple spreading through contiguity or by emboli. The symptoms and pathology of endocarditis and pericarditis are discussed elsewhere in this work.

Literature of '97-'98-'99.

Rheumatic disease of the heart in children should be considered a toxæmia of which pericarditis and endocarditis are pathological manifestations, and poisoning of the heart-muscle can be present without these. Fisher (*Brit. Med. Jour.*, Oct. 15, '98).

In rheumatic heart disease of childhood the first indication of endocarditis is the presence of a systolic murmur at the apex, the second sound being still audible. Often this latter becomes doubled, after a time, the doubling being heard only in the apex-region, and being, therefore, different from the duplicated pulmonary sound of advanced mitral stenosis. The first element of the second sound always remains a sharp, short sound as long as it is audible at all. The second element may be substituted by a short, blowing murmur, an early diastolic, or middiastolic murmur. At a later stage there may be at the apex a systolic murmur, followed by a longer and louder systolic. This presystolic murmur is blowing in character and usually short and is common in children

after a rheumatic attack. It is usually accompanied by evidences of great dilatation of the heart. A presystolic murmur may end sharply with the systole, or it may be prolonged backward to occupy the greater part of the diastole. It has rarely the loud rough churning character of the presystolic murmur of marked mitral stenosis. Care should be taken not to consider a soft, double sound at the base an evidence of commencing aortic disease. It is often the first indication of pericarditis. D. B. Lees (Brit. Med. Jour., Oct. 15, '98).

Very dangerous and rather frequent are the complications involving the brain. In some cases the symptoms are only caused by the hyperpyrexia; when the temperature rises to 41° or 42° C. (105.8° or 107.6° F.) or even to 43° C. (109.4° F.), when the perspiration is very profuse, and signs of endocarditis develop, there is imminent danger of cerebral rheumatism. When symptoms of meningitis occur, they are not necessarily due to veritable inflammation of the meninges, but may be caused by hæmorrhage, œdema, or hyperæmia.

Literature of '97-'98-'99.

Case of hyperpyrexia noted in sub-acute rheumatic fever in a man, aged 32 years, on the sixteenth day of his illness. Temperature when first taken was 106.4° F., and, notwithstanding antipyretic treatment, rose to 107.4° F. Temperature persisted around this point for a period of twelve hours, when it fell rather abruptly and the patient recovered. R. T. Ferguson (Brit. Med. Jour., Jan. 21, '99).

A uræmic condition of the blood may also give cerebral symptoms. Cerebral rheumatism may manifest itself in different ways.

1. When it is *foudroyant* the patient is seized by sudden agitation; although previously unable to make a movement without extreme pain, he now leaves

the bed and walks about, speaks and cries, and suddenly collapses and dies. The temperature ranges from 42° to 43° C. (107.6° to 109.4° F.) and often even gets higher after death.

2. An acute form of cerebral rheumatism is more frequently observed. There is likewise a high fever; the delirium commences more quietly, but after a little time the patient becomes agitated, and may have epileptic fits, these symptoms being followed by profound coma and commonly by death. Although ordinarily the cerebral symptoms are combined with very high temperature, they have, nevertheless, also been observed with a temperature not exceeding 39° C. (102.2° F.); the frequency of the pulse is proportionate to the fever and can reach 120 to 140 per minute. The ordinary duration of the acute form of cerebral rheumatism is two or three days; it may sometimes be of ten to twelve days, and rarely ends in recovery.

3. Subacute or chronic cerebral rheumatism appears in the later stages of the rheumatic fever and is ordinarily of a melancholic and stuporous character. The patients refuse to speak, even to eat, and are often harassed by hallucinations. They may remain in this condition for months, but the disease ordinarily ends in recovery.

Complications of the spinal cord have been described, but their existence has not been proved beyond doubt. The peripheral nerves may also be affected during rheumatic fever, but far more frequently are diseases of the nerves observed after some time as a consequence of the pathological changes caused by this affection. Chorea, polyneuritis, neuralgia, and sciatica have been witnessed by trustworthy observers.

Influence of rheumatism as cause of chorea shown in study of 146 cases of

latter disease: Acute rheumatism as a cause, 0.16 per cent.; rheumatic antecedents, not causal, 23.97 per cent.; nervous disturbance as cause, 64.38 per cent.; rheumatic inheritance, 32.19 per cent.; neurotic inheritance, 33.56 per cent.; structural heart disease, 13.69 per cent.; heart affection, other than structural, 43.8 per cent. H. W. Syers (*Lancet*, Dec. 21, '89).

Literature of '97-'98-'99.

There is some relation between chorea and rheumatism, rheumatism being much more frequent in children suffering from chorea than in children in general. Rheumatism acts as an excitant to chorea by the selective action of toxins upon the motor cells of the cortex, functional affections being caused, but no structural changes. R. B. Preble (*Jour. Amer. Med. Assoc.*, Mar. 11, '99).

Case in which rheumatism was followed by practically complete atrophy of the deltoid and inability to raise the shoulder. By proper instruction, the man was rendered able to use the neighboring muscles. The exercises consisted in elevating the shoulder and adducting it to fix the humerus in the joint. Rothmann (*Deut. med. Woch.*, June 8, '99).

During an epidemic of rheumatic fever Steiner observed thirty-five cases complicated with disease of the peripheral nerves characterized by increased sensibility to pressure and by spontaneous pain. In eight of these the swelling of the joints was not important, but there was tenderness. Steiner claims that the pain of the nerves was caused by perineuritis.

Complications involving the respiratory organs are not so frequently observed. Coryza, tracheo-bronchitis, and laryngitis may be seen during the prodromal stage; during the acute stage the lungs may be affected either by œdema or, more rarely, by pneumonia, particularly of the migratory form. Rather frequently the pleuræ are in-

volved. When the pericardium is affected the disease tends to spread to the left pleura, which consequently is more frequently attacked than the right. Rheumatic pleurisy is characterized by abundant fibrinous membranes, but scanty exudation of serous fluid; it develops very rapidly and furnishes the ordinary physical signs of pleurisy to a very marked degree. Its duration varies from three to eight days. Sometimes the right pleura is attacked while the pleurisy of the left side is undergoing resolution.

Literature of '97-'98-'99.

Case of mixed rheumatism and typhoid as supposed, which, on convalescence, developed diphtheria. The use of anti-toxin caused a relapse of the rheumatism in its most serious form, including heart complications. With convalescence from the diphtheria, pneumonia developed to complicate the rheumatism, which followed a very painful and adynamic course, in turn complicated by pleuritic effusion. The rheumatism disappeared spontaneously with the pleuro-pneumonia. Dickinson (*Lancet*, Jan. 15, '98).

Tonsillitis is a very frequent complication of the prodromal stage; it is commonly believed that it is of etiological influence on the development of the rheumatic fever. Peritonitis is a very rare complication; in some cases bleeding from the bowels and from the uterus has been observed.

Albuminuria is almost constantly observed; acute nephritis and hæmaturia may occur. Anuria is a rare complication; it may be caused either by acute nephritis or by emboli from an endocarditis.

Cystitis, hydrocele, and orchitis have been mentioned by some authors as rare complications of acute articular rheumatism.

Literature of '97-'98-'99.

Seven cases of rheumatic paralysis involving the external rectus in subjects exempt from any syphilitic manifestations, as well as of tabes, and in whom the affection was manifestly associated with a rheumatic diathesis, treated successfully with hypodermic injections of sublimate. G. Martin (*La Med. Científica: Amer. Medico-Surg. Bull.*, June 10, '97).

The cutaneous complications include roseola, urticaria, erythema multiforme, herpes facialis, and, more rarely, erysipelas, gangrene, purpura with ecchymotic spots, sometimes covered by blisters containing a serous, bloody, or purulent fluid. During the course of rheumatic fever small knots sometimes appear under the skin, especially on the front and on the back of the head; they disappear with the other symptoms of the disease.

Literature of '97-'98-'99.

Seven cases of erythema multiforme and two of purpura rheumatica occurring during the course of acute rheumatism. One is justified in regarding erythema multiforme as, *par excellence*, a septic skin disease. From this conclusion and the relation between erythema multiforme and rheumatism, it follows that the latter is also to be regarded as, in a wide sense, a septic blood disease. Singer (*Wiener klin. Woch.*, No. 38, '97).

The muscles in the proximity of the affected joints are always painful and swollen; this may also be observed in muscles more distant from the diseased joints. In rare cases true inflammation and abscesses have been observed in the muscles. In the synovial sheaths of the tendons small knots have been observed especially in children; these knots consist of connective tissue and fibrocartilage, and may exist for some months, but tend to disappear spontaneously.

The affection of the joints themselves

may be complicated by suppurative inflammation leading to opening of the articulation and to pyæmia, or ending in ankylosis.

Many of these complications may, in turn, give rise to such disorders as ankylosis, valvular disease, chronic nephritis, and mental disease and chorea (in children).

Diagnosis.—The diagnosis is usually easy. Rheumatic fever may be confounded with the secondary multiple inflammation of articulations observed in many acute infectious diseases, such, for instance, as scarlatina, rubeola, diphtheria, pyæmiæ, etc., and also with the pseudorheumatic affections of gonorrhœa, syphilis, and tuberculosis. In all these affections the symptoms of the major infection are present and facilitate the diagnosis.

Literature of '97-'98-'99.

There exists a syphilitic pseudorheumatism which has only been observed in the secondary stages. This pseudorheumatism differs from ordinary rheumatism by very marked characteristics: Its appearance in subjects free from any hereditary or personal arthritic taint; the habitual co-existence of secondary manifestations; lesser intensity of the inflammatory phenomena; greater fixity of articular determination; and nocturnal exacerbations of painful symptoms. It yields rapidly to specific treatment, but the pains are often assuaged by local applications of salicylate of methyl. J. Steinberg (*Annals de Derm. et de Syph.*, Oct., '98).

GOUT.—Gout may be discerned from rheumatic fever by the fact that it is never accompanied by fever of the same intensity as the latter disease. In rheumatoid arthritis the fever is much more moderate.

Literature of '97-'98-'99.

Case of a boy, aged 8 years, with exceptionally good family and personal his-

tory, who complained of great pain and acute sensitiveness in the region of the umbilicus, with his knees drawn up. Temperature, 102°; pulse, 100. After thirty hours of illness, acute pain and tenderness in the right knee appeared, and before night all the joints of both legs were similarly affected and were red and swelled. By this time the pain in the umbilical region had disappeared. Sodium salicylate given liberally gave much more relief than morphine had. In three days he was entirely relieved. Only in Tyson's "Practice" could the writer find a case of rheumatism simulating peritonitis. He says he treated a case for days for peritonitis, when a few doses of sodium salicylate promptly arrested the disease. R. F. Graham (Phila. Med. Jour., Sept. 30, '99).

Etiology.—Rheumatic fever is a disease which tends to attack young subjects. Infants are almost safe; but the disease has been observed after the age of five years, and it attains its greatest frequency between the ages of twenty and twenty-five years.

Series of 655 cases of acute rheumatism analyzed. Of the whole number 80 per cent. occurred between the twentieth and fortieth years of age, only 32 having occurred in children under ten years. Of the whole 655 cases treated, 22 died, chiefly from cardiac complications, and there occurred 70 relapses. Thomas Whipham (Brit. Med. Jour., Feb. 25, '88).

Both sexes are liable to the disease; men are perhaps somewhat more frequently affected than women, but that is probably on account of their greater exposure to the inclemency of the weather. An hereditary predisposition seems to exist in some families.

Regarding the hereditary tendency of rheumatism, there was personally found among 32 consecutive cases in private practice a definite history of 23, or 70 per cent. If chorea and erythema be regarded as forms of rheumatism, there were 31 out of 33 cases, or 93 per cent. If cases of arthritis, chorea, and heart

disease be taken together, 180 cases gave 103 with a definite history, or 58 per cent. If chorea (exclusive of grimacing) and heart disease are accepted as evidences of acute rheumatism, the proportion rises to 137, or 80 per cent., with a definite family history. Double inheritance increases the tendency remarkably. Exact resemblance of rheumatism in its clinical course and complications with septic disease noted. There are points which militate against the infective idea, such as the hereditary tendency, the absence of a fixed incubation period, and of a definite course. These points, however, are by no means conclusive. The fact that a micro-organism has not been discovered is another inconclusive point against the theory. Cheadle (Brit. Med. Jour., Jan. 11, '96).

Refrigeration and colds were formerly considered as the ordinary causes of rheumatic fever.

Literature of '97-'98-'99.

Records of about 600 cases of rheumatism studied. Previous health was bad in the majority of cases. Wetting and injuries were chief causes given by patients. When there was no cause known to the patient, excessive indicanuria was found. The joints that were chilled or injured were always the first to suffer. Churton (Brit. Med. Jour., Oct. 30, '97).

The conception of the nature and origin of the disease has, however, completely changed during the last decennium. It is now commonly considered an infectious disease. This view is based mainly upon the facts that rheumatic fever is an epidemic disease and that during the epidemics the cases accumulate in some houses, whereas other houses are quite spared. Norwegian observers have found that the disease does not develop above a certain altitude. It is frequent in the temperate climates only, and is not observed in the tropics nor in the arctic regions. Meteorological conditions do not appear to be of great

influence on the epidemics of rheumatic fever: they have been observed as well in the summer as in winter, during dry as well as wet seasons.

Some authors believe that acute rheumatism bears some relation to other infectious diseases, as, for instance, endocarditis ulcerosa, meningitis, influenza, myocarditis suppurativa.

In most countries isolated cases of acute rheumatism are always present, but epidemics which vary greatly in intensity and duration occur at irregular intervals.

Although it is commonly admitted that rheumatic fever is caused by an infectious micro-organism, it has not yet been possible to discover this specific microbe. Sahli cultivated material taken from the blood, the synovial membranes, and from the pericardium fourteen hours after the death of a patient suffering from rheumatic fever, and found in all specimens pure cultures of staphylococcus citreus, which he considered as the specific bacterium of the disease. Subsequent observations, however, have not sustained this view, and it is yet dubious whether acute rheumatism is the product of one specific microbe or whether different species act simultaneously as pathogenic factors.

Staphylococcus albus and sometimes streptococci repeatedly found in the synovial fluid of the articulations, in pericardial fluid, and in the cardiac valves in cases of acute and subacute rheumatism. Birch-Hirschfeld, Bouchard and Charrin, Triboulet, Sahli, J. Sacaze (Med. Rec., Dec. 1, '94).

In several cases of rheumatic fever a delicate diplococcus isolated differing from all hitherto described and personally considered to be the cause of rheumatism and its complications. Leyden (Med. News, Jan., '95).

Personally not able to isolate any micro-organism from the blood, urine,

or synovial fluid of patients suffering from rheumatic fever. Chvostek (Brit. Med. Jour., Aug., '95).

Many cases of tonsillitis are never followed by rheumatism; while repeated attacks may never be so followed, and yet ultimately a similar attack may never be so followed. These facts, taken together, seem to point strongly to the conclusion that there is a special rheumatic bacillus or bacilli; and, further, that this special bacillus may or may not be associated with those of tonsillitis. That such an association is common and the result immediate cannot be denied. Willoughby Wade (Brit. Med. Jour., Apr. 4, '96).

Of twenty-five cases of rheumatoid joints examined, definite micro-organisms which had peculiar properties of staining and growth, and were usually present in considerable, sometimes enormous, numbers, were found in twenty-four. It is believed that these micro-organisms enter the system by some mucous membrane in a state of chronic inflammation (particularly the tonsils) and then, becoming located in the joints, give rise to poisonous products which pass into the body generally and act especially upon the nervous system. The organism itself is a minute bacillus, exhibiting marked polar staining. Banatyne, Wohlmann, and Blaxall (Lancet, Apr. 25, '96).

Literature of '97-'98-'99.

Ninety-two cases of acute rheumatism examined. In a great number the presence of staphylococci and streptococci was ascertained. Necropsies explain why arthritic effusions in cases of acute rheumatism are found often to be free from microbes, for in such cases the bacteria have their seat in the particular tissues only. These microbes are probably the actual cause of acute rheumatism, which shows its pyæmic nature by its relation to erythema multiforme, sore throat, etc. Singer (Berliner klin. Woch., No. 31, '97).

The infectious nature of rheumatism is beyond doubt when its mode of evolution, its diffuse character, and the fact there is intra-uterine transmission from

mother to fœtus are taken into consideration. In many cases some preceding local process has been observed serving as a point of invasion to the organism (whatever it may be) that is the cause of acute rheumatism. Among these, the most important is tonsillitis, and a striking fact is that the organisms found are exactly the same as those occurring in the tissues which are the seat of the location. The pharynx or tonsils—in fact, any tissue showing a lesion—may allow the organism to enter. Jaccoud (*Jour. de Méd. de Paris*, Apr., '97).

Attempt made to discover cause of acute articular rheumatism. Culture-medium employed the chief characteristic of which is that it contains synovial fluid taken from the joint of a horse. Employing this new culture, and using agar as a control, cultures were obtained that showed upon microscopical examination rounded bodies to which has been given the name of "pseudospores." These are gradually replaced by two kinds of bacilli. The pseudospores or their bacilli are most likely the cause of acute articular rheumatism. A. Riva (*Centralb. f. Inn. Med.*, Aug. 14, '97).

Bacilli cultivated from the blood and the pleuritic exudate of a patient suffering from rheumatic fever, the culture of which prospered particularly in milk and by close exclusion of the air. The bacilli proved toxic to guinea-pigs and rabbits, provoking symptoms of a septic disease, but no affection of the joints. Thiroloix (*Gaz. Hebdom.*, No. 79, '97).

The frequent coincidence of angina catarrhalis generally precedes the rheumatic affection, and both affections are caused by microbic infection. Buss (*Deutsch. Arch. f. klin. Med.*, B. 54).

Some rheumatic manifestations are free from bacterial influence, such as those due to serums, cell-products, etc. No constant specific organism is found in those forms due to bacteria, and, as the results of infection by those bacteria that are active is not always the same, it is probable that in certain individuals there is a predisposition to articular affections. Cold has an undoubted influence. This influence, however, is limited to the preparation of an already-predis-

posed individual for microbic invasion by lowering general or local vitality. Acute articular rheumatism thought due to a bacterium with special pathogenicity toward joints and which rapidly loses its virulence. The staphylococcus is the most frequent agent here, both in cases of frank rheumatism and in the joint-affections associated with scarlet fever, puerperal sepsis, etc. Pseudorheumatic affections are due to hæmic infection, from some local affection, such as gonorrhœa, with joint-manifestations. Chronic rheumatism is the result, when the acute attack has largely subsided, leaving only a less active process; or when the pseudorheumatic process has been prolonged, causing permanent joint-changes; or when the resistance of the individual has been so great or the virulence of the micro-organisms so slight that general manifestations were absent. Triboulet (*Revue de Méd.*, Apr. 10, '98).

Rheumatism is an infectious disease, secondary to some injury to the mucous membranes; particularly those of the mouth, which permit the entrance of the infectious agent. Reinhard (*Münch. med. Woch.*, Sept. 13, '98).

Idea ridiculed that the poison of rheumatism enters the system through solution of continuity in the mucous membranes. Rheumatic pains and fevers are due to interference with the secretory activity of the skin. Rabl (*Münch. med. Woch.*, Sept. 13, '98).

Number of cases of relapsing rheumatism examined for glandular enlargement in cases in which an infectious origin was suspected. In many of the cases examined it was found that the glands sometimes in the immediate neighborhood of the affected joints became swelled at the time of attack. In most cases there was some pain in the swelled glands. Cultures made on various media from one of the cases were negative, but cover-slips from the joint-liquid and neighboring enlarged glands both showed a diplobacillus. Histologically the enlarged glands showed the lesions of lymphatics with increase in trabeculæ of the glands. This glandular enlargement is regarded as further proof of the infectious character of rheumatism. Chauf-

fard and Ramon (*Revue de Méd.*, May, '98).

The presence of lactic acid in the economy is a predisposing cause of rheumatism, but there is no conclusive evidence that it is the exciting cause. The disease is characterized by reduced alkalinity of the blood, and caused by toxic agents whose character and identity are as yet a mystery. C. R. Marshall (*N. Y. Med. Jour.*, Aug. 12, '99).

Pathology.—In all cases of rheumatic fever congestion and hyperæmia are present in the joints; but as these alterations are extremely fugitive it is ordinarily impossible to demonstrate them by the autopsy. In more advanced cases the synovia is augmented and shows microscopically a great number of cells containing many nuclei and molecules of fat, resembling pus-cells. In some cases the cells are not free, but are contained in a net-work of fibrin, appearing to the naked eye as small flakes. True pus is not found in the joints except when other infections have invaded the body at the same time as the specific infection of the rheumatic fever. The synovial membrane of the affected joints is red and swelled, with turgid prominences, and its capillaries are gorged with blood; the cells of the synovial membrane tend toward multiplication, containing 10 to 12 nuclei. The cartilage is also involved; its cells multiply and form oblong capsules containing many secondary capsules. The macroscopical result of these alterations is that the cartilage has lost its natural polish and that it is finely striated. All these pathological changes are common to every case of acute arthritis and are not specific as regards the rheumatic joint-affection.

The rheumatic alterations of the endocardium, the pericardium, etc., revealed by autopsy present the ordinary signs of an acute inflammation, but

nothing which is characteristic of rheumatic fever proper. During the course of the latter the blood is in a morbid state, containing much more fibrin than healthy blood; when evacuated it forms a small clot covered by a thick layer of fibrin, and when a drop of blood is placed under the microscope an abundant net-work of fibrin appears. The other constituents of the blood are diminished, the solid contents of serum ranging from 60 to 80 per mille. The number of red corpuscles is considerably diminished, while the proportion of hæmoglobin present is 7 per cent. instead of the normal 13 per cent. While the number of red corpuscles may decline to one million per cubic millimetre, the white corpuscles increase and reach in some cases the amount of 20,000 per cubic millimetre. Milk acid, urea, and uric acid have often been sought for, but have never been found by the chemical examination of the blood taken from patients suffering from rheumatic fever.

Conclusions regarding influence of uric acid as an active and efficient influence in production of acute articular rheumatism.

1. That any diminution of the alkalinity of the blood and tissue-fluids in a given region of the body causes the uric acid coming to it in the blood to become less soluble and more easily retained; in other words, causes it to remain in the fluids of the less alkaline region, instead of passing on in the circulating blood. The blood thus becomes poorer, and the region of diminished alkalinity richer in uric acid or biurate.

2. According to Sir A. Garrod, certain regions and tissues, as the liver, spleen, and the cartilages and fibrous tissues of joints, are normally less alkaline than the other tissues of the body and their fluids; hence, in any general diminution of alkalinity these tissues will be most affected, and the circulating uric acid will first of all be rendered insoluble or retained in them.

3. It follows, from what has been said, that the uric acid, or biurate, thus concentrated or precipitated in certain tissues, gives rise to irritation, going on to inflammation, which is roughly proportional to the amount of uric acid concentrated in any given spot, and the time during which it can act upon the tissues. It may be noted that when any tissue or organ is thus collecting and retaining, so to speak, all the uric acid that comes to it in the blood-stream, and while the local pains in the tissues concerned are increasing, the blood grows poorer in uric acid; as a normal consequence of this, the amount excreted in the urine diminishes, so that we have an independent source of evidence as to what is going on. Conversely, when an alkali or other solvent of uric acid has been introduced into the circulation, the process is reversed: the blood passing through the irritated tissue now takes up in solution the uric acid that was previously retained or deposited; the affected organ or tissue grows poorer in uric acid, while the blood grows richer; and, as an evidence of this latter change, there is an increased excretion of uric acid in the urine.

By assuming that the chief predisposing causes of rheumatism diminish the alkalinity of the blood, or of the fluids of local tissues, it is plausibly explained in the foregoing conclusions how the uric acid, rendered less soluble, is attracted to and made to accumulate in the tissues sufficient to cause pains and rheumatic inflammation, while the blood in general circulation and the urine would yield less than natural, when subjected to the usual tests. A. Haig (Practitioner, Feb. to Apr., '91).

Lactic acid is the direct cause of the active symptoms of rheumatism. An excess of this acid is generally produced by eating too freely of food containing a large percentage of starch and sugar or proteids, and thereby introducing more than can be completely oxidated. By such incomplete oxidation of the proteid compounds within the system, the percentage of urea in the urine falls, uric acid increases, and lactic acid appears in large quantities; and to this

might yet be added a long list of other by-products. But it is the lactic acid that chiefly appears in rheumatic affections. W. H. Porter (Amer. Medico-Surg. Bull., Jan., '93).

Literature of '97-'98-'99.

From chemical experiments the following conclusions have been reached. The phenomena of rheumatism rest upon the accumulation of urate spherules in the connective tissue and cartilage.

The alkaliescence of juices of connective tissue is due to sodium carbonate (not the bicarbonate or phosphate).

Acids favor, in the extreme, the precipitation of the spherules, while alkalis are in the opposite extreme of preventing this precipitation. Sodium salicylate favors the transformation of urate spherules into urate needles. This explains why this salt cuts short the inflammatory process, but predisposes to relapse, which is due to the needles' persistence in the tissues. Urate spherules are naturally subject to oxidation; urate needles are not. Sodium carbonate and bicarbonate do not directly hasten solution of needles, but probably favor oxidation of spherules. These salts are best given in mineral waters free from lime and containing sodium chloride and carbonic acid. Mordhorst (Centralb. f. Inn. Med., No. 19, '98).

Prognosis.—The prognosis is rather good as regards life, as very few cases end in death (0.3 per cent.). Complications, particularly those involving the heart, are, however, frequent and often lead to serious consequences.

The gravid state renders acute articular rheumatism more serious and increases the difficulty of cure. Von Noorden (Inter. klin. Rund., Apr. 23, '93).

Literature of '97-'98-'99.

The immediate prognosis in rheumatic heart disease in children is good, the remote prognosis always grave, the end occurring in youth or early adult age. J. L. Steven (Brit. Med. Jour., Oct. 15, '98).

In the prognosis of any case of rheu-

matic heart disease the two influencing factors should be the presence of widespread pericardial adhesions and the persistent recurrence of rheumatic manifestations. Osler (*Brit. Med. Jour.*, Oct. 15, '98).

Treatment. — In the treatment of rheumatic fever it is of importance that the patient be placed in a large, well-ventilated room. The diet should be frugal; during the febrile period liquid food must alone be given, with lemonade, carbonated waters, and milk as beverages. The bowels ought to be kept regular.

Many authors deem it preferable to commence the treatment by giving a free purgative.

As a specific remedy against the infection itself, salicylic acid and combinations containing this drug have nearly supplanted all other drugs. Salicylic acid may either be given pure or in combination with alkalines (sodium or strontium). Pure salicylic acid is best tolerated when it is given in capsules, containing, each, $7\frac{1}{2}$ to 15 grains of the drug; this dose is to be repeated four, five, or even six times per day, until the pain is relieved and the temperature falls. When symptoms of intoxication (such as tingling in the ears or nausea) appear the use of the remedy must be discontinued or the dose greatly reduced. In many cases the pain is very rapidly relieved by this treatment and patients who, in the morning are not able to move, are completely relieved after a treatment of twelve hours. In other cases the fever disappears, but the pain and swelling of one or more joints continue for some time. Even when all symptoms have disappeared, it is advisable to continue the use of salicylic acid for some time, but in lesser dose. When the use of salicylic acid is dis-

carded too soon, recurrence is apt to occur.

Salicylic acid used in twenty-five cases in the form of a 20-per-cent. ointment rubbed into the skin. In most of the cases the therapeutic effect was most decided. Hasenfeld (*Pester Med.-chir. Presse*, No. 47, '94).

Literature of '97-'98-'99.

In articular rheumatism the following ointment is valuable:—

- R Salicylic acid, 45 grains.
- Oil of turpentine, $\frac{3}{4}$, drachm.
- Adeps lanæ, 5 drachms.
- Lard, 5 drachms.

This is spread over the parts, and a dressing of absorbent cotton applied and covered with any impervious material. Bourget (*Jour. des Prat.*, No. 29, '98).

Many authors prefer the use of the salicylate of sodium, which is commonly given in solution, 1 to $1\frac{1}{2}$ drachms or even 2 drachms being administered. It has the same effect on the disease as the pure acid.

The amount of salicylate of sodium necessary in the treatment of rheumatism may be decidedly lessened by the simultaneous use of hot baths. The patient is bathed in water having a temperature of from 100° to 105° F. every morning. This is followed by the administration of from 15 to 23 grains of salicylate of sodium. At first from 40 to 60 grains per diem are needed; later from 30 to 40 grains suffice. Moritz (*Med. Week.*, ii, p. 439, '94).

Use of liberal quantities of the sodium salicylate recommended in acute articular rheumatism. It should be given in divided doses: $15\frac{1}{2}$ grains every two or three hours until the desired relief is obtained. Henri Huchard (*N. Y. Med. Jour.*, Jan. 12, '95).

Ammonium salicylate is valuable in the treatment of rheumatic affections. It is best given in milk, and is usually well borne. It is the best method of administering the salicylates for ordinary purposes, as it is much less depressing in its action than the other salts of sali-

cylic acid. Wood (Univ. Med. Mag., Jan., '95).

Several cases of both acute and sub-acute rheumatism successfully treated with strontium salicylate, given in doses of from $7\frac{1}{2}$ to 15 grains every three hours. Eshner (Phila. Polyclinic, Aug., '95).

In acute rheumatism it is not best to give large amounts of the salicylates, for they have a depressing effect upon the patient. It is well also to combine a little colchicum with the salicylates. Chloride of ammonium and acetate of potash, 10 to 15 grains each every two hours, have been used with good results. Robinson (Med. Rec., Feb. 1, '96).

Literature of '97-'98-'99.

Grave consequences may result from the employment of sodium salicylate in acute rheumatism with visceral localizations, for it neither cures nor prevents them, but may favor production. The drug should be suspended when delirium sets in before the diagnosis of cerebral rheumatism is established, or if the delirium be of an alcoholic or hysterical nature, or result of any intoxication. In cardio-pulmonary complications the same is true. Salicylates lower the fever and relieve pain, but do not influence at all these localizations. By persisting in their employment, involvement of the myocardium is hastened. Jaccoud (Lyon Méd., Mar. 14, '97).

In the rheumatism of children full doses of sodium salicylate are not required; and they may be harmful from their depressant effects. The milder drug, salicin, may be substituted in most cases in doses of 5 to 20 grains; or quinine in doses of 1 to 3 grains every four hours. In each case an alkali, sodium or potassium citrate, should be combined and given in doses according to age. The use of depressant drugs—as antipyrine, antifebrin, and aconite—with a view of lowering temperature cannot be too strongly deprecated.

Gibson found that cases of acute rheumatism treated by rest escaped permanent heart-lesion in the proportion of two to one compared with those permitted free action. When pericarditis

supervenes, if there is much pain and distress, one or two leeches may be applied to the præcordia. The most effective local application is that of the ice-bag.

In the deadly form of cardiac inflammation persistent, recurrent, subacute endocarditis, and pericarditis, opium, digitalis, and strophanthus, with an alkali, are the drugs of most service. Alcohol is also a most useful agent.

As a last resource, in the case of older children only, when the heart shows signal signs of failure, when the first sound becomes short and feeble, and the pulse small and irregular, hypodermic injections of liquor strychniæ, combined with brandy or digitalis, are valuable. Cheadle (Treatment, No. 5, '97).

Nothing certain is known of the manner in which salicylic acid and its combinations influence the rheumatic infection; possibly it has a specific action on the microbes; it is a reliable, but not an infallible, remedy, and some cases are rebellious to its action. Some patients do not tolerate it, vomiting being induced. It may then be administered by inunctions (*vide supra*) or enemata.

An aqueous injection should first be given patient to evacuate intestines, and the solution should be heated to a temperature equal to that of the human body.

Following formula given preference:—

R Salicylate of soda, $1\frac{1}{2}$ to 2 drachms.

Water, $3\frac{1}{2}$ ounces.

Tincture of opium, $1\frac{1}{4}$ drachms.

Best instrument for giving this enema is the ordinary injection-syringe of $3\frac{1}{4}$ ounces' capacity, joined with an œsophageal sound, which may be made to penetrate about eight inches into the large intestine. It is important that the injection be retained as long as possible in the intestines. Erlanger (Deutsches Archiv f. klin. Med., vol. iii, '93).

Salophen, a drug which in the bowels decomposes into salicylic acid and phenol, has been recommended as a substitute

for salicylic acid. It is especially useful when given late in the course of the disease, when the acute fever has been mastered by the salicylic acid. Salophen is well supported even under prolonged use. The daily dose is 1 to 1 $\frac{1}{2}$ drachms.

Salophen recommended in acute rheumatism in doses of 15 grains every three hours, in conjunction with sodium bicarbonate, 10 grains three times a day. W. H. Flint (N. Y. Med. Jour., July 30, '92).

Salophen acts quickly and satisfactorily in acute articular rheumatism, and is more satisfactory than salicylate of soda and salol. The more acute the case, the more satisfactory the action of the drug. Koch (Deut. med. Woch., May 4, '93).

Literature of '97-'98-'99.

It is in the acute variety of articular rheumatism that the good effects of salophen are manifested. It should be administered at the outset in daily amount of 90 grains taken in six doses in starch-wafers. It is always well borne; there is no malaise, nausea, vertigo, or ringing in the ears. In equal dose it is a little less rapidly efficacious than sodium salicylate. M. L. Galliard (La Presse Méd., No. 56, '97).

Salophen in forty cases of rheumatism, giving 15 grains six times daily. It has a good effect in acute and chronic articular and muscular rheumatism. Klimenko (Ther. Monats., July, '98).

Of late a compound of salicylic acid, salicylate of methyl, has been recommended for external use; it is a volatile fluid of an aromatic odor; the pure drug is preferable to wintergreen-oil, a vegetable extract employed by perfumers and containing a large percentage of salicylate of methyl. The affected joints are to be painted with the drug and enveloped with some impervious material. Experience has shown that the salicylic acid contained in methyl-salicylate is absorbed through the skin. It

is also chemically demonstrable in the urine. It removes the pain and reduces the temperature of rheumatic fever.

Local application of salicylate of methyl used in different forms of rheumatism (acute, subacute, and gonorrhœal, etc.). The drug must be used in cases in which for any reason it is desired to obtain a local effect, and when the ordinary remedies for rheumatism are not well borne by the stomach. Salicylate of methyl acts well in acute articular rheumatism, but on account of the difficulty of applying it to painful joints it must be employed in such cases only if the internal administration of remedies has failed. On the other hand, in subacute and chronic forms, in the painful paroxysms which occur from time to time in the different varieties of deforming rheumatism, local absorption of salicylate of sodium acts as well as salicylates taken by the mouth, often better. Lannois and Linossier (Méd. Mod., Aug. 19, '96).

Literature of '97-'98-'99.

At the Congres f. Innere Medizin salicylate of methyl recommended as well against acute as against chronic rheumatism. Lemoine and Ott (Wiener med. Presse, p. 706, '97).

Following suggested as summary of the chief points in reference to the prophylaxis of rheumatic hyperpyrexia: 1. Cases in which the pyrexia shows a tendency to rise instead of decline under full doses of the salicyl-compounds, and in which no intercurrent condition can be detected which might account for the increasing pyrexia, should be treated at once by cold applications without waiting for the onset of nervous symptoms or for other prodromata of rheumatic hyperpyrexia. 2. When delirium appears in a case which exhibits pyrexia, and no intercurrent visceral complication can be made out which might account for its presence, the immediate employment of cold is called for. 3. Should delirium appear while the temperature remains normal, a mild form of cold application—e.g., an ice-cap to the head—should be employed, and on the appearance of

pyrexia more vigorous methods ought to be adapted without waiting for any extreme degree of pyrexia (*e.g.*, 105° F.) to be reached. 4. Cases in which the hyperpyrexia is, as it were, accidentally discovered to be present offer, of course, no field whatever for prophylaxis, but treatment by cold should be commenced at once without waiting for the appearance of nervous symptoms or attempting to reduce the temperature by means of any antipyretic drugs. H. G. Langwill (*Scottish Med. and Surg. Jour.*, Feb., '99).

As the long-continued use of salicylic acid is not without inconveniences, different other antipyretics have been tried as substitutes for it; such are antipyrine, antifebrin, salol, phenacetin, malakin, analgen, asaprol, pilocarpine, etc. Each of these drugs has in some cases proved successful; none of them, however, has any chance of supplanting salicylic acid as the most ready and reliable remedy.

Malakin, a salicylate combined with an organic base, prescribed in daily doses of 75 to 90 grains, recommended. Ontagnon and Ducher (*Loire Méd.*, July, '94).

Good effects of salophen noticed when given in daily doses of 1½ to 2 drachms at first and in reduced amount afterward. Pierre Marie (*Semaine Méd.*, June, '95); Huot (*Lancet*, Oct., '95); Lavrand (*Jour. des Sci. Méd. de Lille*, Dec., '94).

Ten patients with articular rheumatism treated by injecting the serum obtained by bleeding patients who had recently undergone an attack of acute articular rheumatism. Reaction from the injection was variable, not only for each patient, but even for each injection. It cannot be said to have a specific therapeutic value, for all that in some cases the cure followed two or three injections of serum. In the majority it was necessary to resort to the use of salicylates. J. Weiss (*Revue de Thér.*, No. 11, p. 325, '96).

Hydrotherapy recommended for rheumatism, the following methods being

used: (1) the administration of pure, soft water at frequent intervals, about 4 litres being given to an average man per day; (2) irrigation of the intestinal tract with water to which a little liquid soap has been added; (3) thorough moistening of the body, either by bathing, the wet pack, or by sprinkling. E. Lee (*Jour. Amer. Med. Assoc.*, July 25, '96).

In acute articular rheumatism ichthyol (25 to 100 per cent.), rubbed into the affected parts, has seemed to relieve pain without causing irritation. Personal preference, however, is for a mixture of salol, ether, and collodion—of the first two, a drachm each, to an ounce of the latter—painted on the affected joints twice or oftener daily; this has certainly resulted in relief of pain, even if no permanent benefit ensued. Sodium salicylate exerts a more prompt and decided action than salicylic acid, and should be given to an adult, 10 to 20 grains every two to four hours until the desired effects are obtained, or until tinnitus is induced, after which the dose may be lessened or salicin substituted. Baker (*Amer. Pract. and News*, July 11, '96).

Literature of '97-'98-'99.

Lactophenin has a well-nigh specific effect in acute articular rheumatism, advantageously replacing salicylic acid and the salicylates where these are fruitless and intolerable. The dosage is 7½ to 15 grains, repeated several times a day. G. von Roth (*Wiener klin. Woch.*, vii, 37, '98).

Ichthyol applications, employing one of the following formulas, recommended in articular rheumatism:—

1. R Ichthyol, 10 grammes.
Distilled water, 10 grammes.
Adeps lanæ, 30 grammes.
2. R Ichthyol, 10 grammes.
Adeps lanæ, 20 grammes.
Extract of bellad., 1 gramme.
3. R Ichthyol, 10 grammes.
Diluted alcohol, 10 grammes.
Distilled water, 40 grammes.—
M.

Arendt (*Jour. des Prat.*, No. 29, '98).
Methylene-blue employed in rheuma-

tism. It does not diminish pain, but lessens fever. In treatment of rheumatism its value is equal to salicylate of soda. It is necessary to employ a pure product. Le Moine (Le Prog. Méd., Feb. 4, '99).

The complications of the acute articular rheumatism are to be treated according to their nature and the indications of each; the hyperpyrexia and the cerebral rheumatism may necessitate the application of tepid and even cold baths combined with large doses of antipyretics; in the complication with endocarditis digitalis must be employed, etc. When the fever declines, but one or more articulations remain swelled and painful, it has been recommended to employ bandage for some time. Also baths of hot water or, better, of hot air will in many cases bring relief.

Hot, dry air, though an old remedy, has recently been considerably used, such reliable writers as Landouzy and Déjerine, of Paris, having reported marked success with it at temperatures varying from 200° to 250° F., in the various forms of rheumatism.

According to A. Graham Reed (N. Y. Med. Jour., Sept. 17, '98), the blood becomes heated from 1° to 5° F., and this seems to be the therapeutic factor. The heat stimulates vascular activity, reduces localized congestion, and stimulates metabolism. Profuse diaphoresis is promoted without the unpleasant head-symptoms usual in a steam-bath, as the patient breathes the ordinary air of the room.

Literature of '97-'98-'99.

Various effects of local application of superheated air. Local and general perspiration is induced in amounts from 16 to 25 ounces; to this loss of perspiration the reduction of body-weight is due. The body-temperature rises, but usually less than 2° F. The pulse-rate increases

slightly during the application of the method, and upon its cessation gradually returns to its normal rate. Hence the harmlessness of the method, and its slight and temporary influence upon the general condition. M. Mendelsohn (Zeit. f. Diätetische u. Physik. Ther., H. 1, S. 52, '98).

No treatment has been found able to prevent surely the complications or recurrence, but most authors agree that the use of salicylates in sufficient doses continued for some time after the return of normal temperature gives the best results in both respects.

Chronic Articular Rheumatism, or Rheumatoid Arthritis.

Synonyms.—Rheumatic gout, *rhumatisme chronique infectieux*, polyarthritis deformans.

Definition.—A chronic polyarticular disease allied in some respects to rheumatism and due, in all probability, to the invasion of micro-organisms.

Symptoms.—Rheumatoid arthritis presents few or perhaps no premonitory symptoms, although some patients claim that they have felt pains in the ball of the thumb or in the wrist a short time before the appearance of the affection in the joints. The disease itself begins with swelling of one or more joints, the latter assuming a spindle shape. The skin becomes reddened or bluish; the local temperature is raised one or two degrees. In some cases the affected joints present an elastic swelling with distinct fluctuation; in other cases a soft, flabby enlargement is witnessed, or crepitation may be elicited from the start by passive movements. Pain is almost constantly complained of, caused particularly by motions of the joint; but in the more acute form of the disease it is also present during rest. Synovial pouches are sometimes found in the proximity of the joint which insinuate

themselves between the muscles and tendons. This is especially observed in the small joints of the fingers.

The affection usually begins at the fingers, but from there it spreads upward to the larger articulations; and the elbow, shoulder, knee, and even the hip may successively be attacked. In the larger joints an effusion of fluid, sometimes quite profuse, is often observed. The affection ordinarily spreads from the periphery toward the centre and a certain degree of symmetry is commonly noticed with regard to the joints affected and to the time of their invasion.

All joints are liable to be attacked by the disease, even those of the spine, the ribs, and the jaws. The different articulations are involved with varying frequency, as shown by the following statistics of Garrod and Bannatyne:—

	BANNATYNE.	GARROD.
Hands affected . . .	97.4 per ct.	86.0 per ct.
Elbows	84.6 per ct.	25.0 per ct.
Neck	82.0 per ct.	
Knees	73.0 per ct.	60.6 per ct.
Ankles	67.9 per ct.	34.4 per ct.
Jaws	67.9 per ct.	25.0 per ct.
Shoulders	61.9 per ct.	25.0 per ct.
Hips	12.5 per ct.	14.6 per ct.
Sterno-clavicular . .	2.5 per ct.	

Ankylosis either from fibrous changes or from interlocking of the osteophytic outgrowths (often observed in the jaws) frequently results. Another frequent sequel of the disease is deformity of the articulations, due to dislocation of the bones; this is particularly observed in the hands and in the knees. In the hands there may be deflection to the ulnar side, or, more rarely, to the radial side. Flexion and hyperextension may also be observed and every possible combination of these deformities may occur.

While these deformities develop, the knuckles and the wrist become enlarged

and nodular and the muscles of the fingers atrophy; as a rule, the thumb escapes in the less severe cases, but is affected when the disease is more general. The deformity of the knee ordinarily consists in flexion and some rotation of the foot outward; in some cases there is much fluid distending the knee, in others the ligaments surrounding the joint present a pulpy softening which may easily be confounded with effusion in the joint. In a third type we only find enlargement and immobility of the heads of the bones. The deformities of the joints are caused by the weakness of one set of muscles, these being overcome by the greater strength of other muscles and by the diminished power of the softened ligaments. Pain is present in almost all cases, but its intensity varies according to the severity of the case and the stage of development.

Cardiac symptoms are present in a certain portion of cases (7.9 per cent., Bannatyne); the lesions of the heart are, however, not so severe or so extensive as in the acute articular variety. In a considerable number of cases there is enlargement and tenderness of glands, corresponding to the affected joints. The skin shows small fibrous nodules, as in acute articular rheumatism. In all acute cases atrophy of the muscles especially of the extensors and the interossei is observed; the tendon-reflexes are often slightly increased.

Fever is always present in the acute stage, but it is irregular and not of a very acute type. The temperature seldom or never rises so high as in the rheumatic fever. The pulse is higher than usual, but even in the later stage of the disease, when the fever has passed away, a pulse of from 80 to 100 is no rare occurrence.

Anæmia is always observed in rheuma-

toid arthritis, especially marked in the very acute cases and in the chronic forms of very long standing. Hemorrhages are rare, but spots of purpura are witnessed.

Marked anæmia is seldom found in rheumatoid arthritis except in the advanced and acute stages, but in about 95 per cent. of the cases a slight blood deficiency has been found. Hemorrhages due to anæmia are rare. G. A. Bannatyne (Lancet, Nov. 28, '96).

Neuritis often spreads from the affected joint to the nerves in its proximity; pain along the course of the nerves is experienced. Faradic irritability is lost, but that to the galvanic current is increased; commonly the disease from the first affected nerves spreads to other branches. A polyneuritic inflammation, symmetrical in development, may also be observed. The skin may show pigmentation, or that covering the diseased joints (glossy skin) becomes atrophied. Erythema and œdema are also met with. Sweating is observed in almost all cases. The urine is, as a rule, normal.

The disease may assume an acute type. This is particularly the case in children and young adults. The onset of this form is characterized by pyrexia, thickening of the joints affecting the synovial membranes and cartilages as well as the ligaments around the affected joint, but without osteophytic changes. The glands are always enlarged.

Literature of '97-'98-'99.

Review of the literature upon acute articular rheumatism in infants under one year showing that *bona-fide* acute articular rheumatism in infants is very rare, although a number of cases have been reported as such. Case personally witnessed of genuine acute polyarticular rheumatism in an infant 9 months old. In the diagnosis of such a rare condition every other possible cause for the joint-

affection must be excluded. The points to be established are mobility, proneness to migrate from joint to joint, absence of all tendency to suppuration, frequency of inflammation of the cardiac serous membranes, the favorable influence of the salicylates; a family history with absence of affections as are apt to be attended with inflammation of the joints. According to this test, only nineteen undoubted instances of acute articular rheumatism in infants under one year found in the literature. D. J. Milton Miller (Phila. Med. Jour., July 22, '99).

At first the disease only attacks one or a few small joints of the hand or the foot; but from there it spreads very rapidly to most other joints of the body, affecting them symmetrically. In the early stages the articulations are soft, doughy, and swelled; later on they become harder and stiffer. The other symptoms—atrophy of the skin and of the muscles, etc.—develop in a short time. The pain is very marked, and sometimes sleep can only be obtained by narcotics. Complications in the direction of the heart are very common.

The chronic form of rheumatoid arthritis is either the later stage of the acute form or the disease may from the beginning take a chronic course, spreading much more slowly and producing thickening and hardening of all the tissues of the affected joints as well as osteophytes, deformities, ankylosis, etc. Fever is absent or is of no importance, the pain much less marked, and the glands commonly remain normal.

Diagnosis.—Rheumatoid arthritis may be confounded with the pathological changes caused by chronic gout, or by some diseases of the nervous system (tabes, syringomyelia, etc.) and with the sequelæ of acute rheumatism, tuberculosis, gonorrhœa, syphilis, etc.

From CHRONIC GOUT rheumatoid arthritis is distinguished by the absence

of the characteristic features of gout. There is no history of attacks of acute gout, no affection of the kidneys, and the patient has not suffered from uric-acid gravel or sand. Examination of the sediment by means of the centrifugal apparatus reveals no renal casts—always present in chronic gout—in the urine.

Lastly the Roentgen radiograms of the two affections are of a totally different appearance: in gout the uratic deposits are permeable to the Roentgen rays, and do not show, therefore, in the photograph; the bone-heads of the diseased joint appear in clear outline, a distinct, clear space representing the cavity of the joint and the cartilages. In rheumatic gout the heads of the bones always appear obscure and deformed; even in acute cases, or when much mobility of the affected joint is still left, the photograph looks as if the two bony heads were melting together.

LOCOMOTOR ATAXIA.—In tabes and other serious nervous affections the joints may be diseased in a manner much resembling rheumatoid arthritis; in such cases the Roentgen photogram is of great value; when the affection is due to lesions of the nervous system, rapidly progressing absorption is found in the bones, and only portions of the bones are visible in the photogram, while large portions of them have totally disappeared.

The points of special significance in the diagnosis of rheumatoid arthritis are: 1. The sex and age of the patient. 2. The soft spindle enlargement of the finger-joint and the swelling of the wrists; together these form the most constant symptom, and in nine cases out of ten the disease can be easily and certainly diagnosed from the hand alone. 3. The cold, sweating pains. 4. The affection of the jaws and neck. 5. The cachexia and wasting. And, of less im-

portance: 6. Pigment-changes. 7. Tachycardia. Gilbert A. Bannatyne, Arthur S. Wohlmann, Frank R. Blaxall (*Lancet*, Apr. 25, '96).

Literature of '97-'98-'99.

There is a disease occurring in children before the second dentition which is characterized clinically by elastic, fusiform enlargement of joints, without bony change, and also by enlargement of the glands and spleen.

The disease has hitherto been called rheumatoid arthritis, but it differs from that disease in adults clinically in the absence of bony change even when no disease is advanced, and in the enlargement of glands and spleen, and pathologically in the absence, even in advanced cases, of the cartilaginous changes, which are found quite early in that disease, and also in the absence of osteophytic change. Still (*Medico-chir. Trans.*, '97).

Etiology.—Authors have disagreed very much regarding the etiology of this disease. Some have held it to be a secondary affection, consecutive upon acute articular rheumatism, while others have connected it with gout or believed it to be a senile change of the joints. Again, others have argued that it is caused by some abnormal nerve-condition having its seat in the cord or in the peripheral nerves. Recently, however, the prevailing view has been that the disease is caused by bacteria, though the specific bacterium of the disease has not been recognized. Indeed, it is possible that several dissimilar varieties of bacteria may have a similar effect on the tissues of the joints.

German authors still maintain that some few cases are dependent on a true rheumatic infection and develop in direct continuation of an acute rheumatic disease. For such cases Bäumler proposes to reserve the denomination "chronic rheumatism of the joints"; but he admits that they are of rare oc-

currence; and other authors, including myself, have never observed any case in which the affection was proved to have commenced with an attack of acute articular rheumatism. The second group of cases, representing an overwhelming majority and recognized by German authors as "polyarthritis deformans" (identical with the rheumatoid arthritis or rheumatic gout of the English and American authors) is, by general consent, attributed to the invasion of a specific bacterium. This view is supported by much evidence: the disease begins in one or a few joints and spreads from there not only to other joints, but also to the nerves, the heart, the muscles, and the skin. It often occurs as a continuation of other infectious diseases, such as influenza, tonsillitis, typhoid, etc. Bannatyne notes that in 25 per cent. of all cases there was a history of disease of the female organs of generation and in 20 per cent. catarrh of the gastro-intestinal or respiratory mucous membranes. I have made the same observation; in many cases the patients confidently consider influenza or diseases of the female organs of generation as the cause of the affection; in some cases it had developed in direct continuation of puerperal affections.

All authors agree that cold and damp rooms, especially when used as sleeping-chambers, are predisposing to the development of rheumatoid arthritis; these conditions certainly favor the development of micro-organisms and their invasion into the body.

Of the predisposing causes, heredity is frequently observed. Women are much more liable to the disease than men. Age is of importance, most cases commencing between the ages of 40 and 50 years, but the disease may occur earlier and even children may be affected

by it. In women puberty and the climacteric are particularly liable to the affection.

Many authors have tried to isolate the microbes of rheumatoid arthritis, and in many instances they have succeeded in cultivating bacteria from material taken from the affected joints. Unfortunately, however, they do not agree in the description of the micro-organisms, and have not been able to reproduce the disease in animals.

Bannatyne and Wohlmann cultivated from the synovia taken from diseased joints a dumb-bell-shaped bacillus, resembling in many cases a diplococcus, as the ends of it were deeply stained by carbol-fuchsin and other coloring matters, whereas the connective portion was not at all stained; the bacillus was aerobic, grew on blood-serum, agar-agar, and in beef-bouillon. Blaxall found the same bacillus in the blood of the patients, but in small amount.

Schüller in 1893 described a bacillus cultivated from the synovia of the affected joints, but his description of it, its manner of development, etc., make it obvious that it is not identical with that observed by Bannatyne.

At the meeting of the French Association for the Advancement of Science, in 1894, the result of the bacteriological researches in 22 cases of chronic articular rheumatism was given. In 11 cases the bacillus albus was found, in 4 streptococcus, in 3 the staphylococcus aureus, in 2 the bacterium coli, and in 2 none. Bouchard and Charrin (*Le Bull. Méd.*, Aug., '94).

Short and thin bacillus resembling much a diplococcus, growing only in synovia, found in one case. Chauffard and Ramon (*Revue de Méd.*, May, '96).

Literature of '97-'98-'99.

Small diplococci which stained by Gram's method isolated from the exudate in the joints of a case dying after

presenting clinical picture of extreme arthritis deformans. The organism grew in all media, but did not develop quickly. Similar micro-organisms were obtained from the liver; the injection of cultures of this diplococcus into the knee-joints of rabbits gave rise to a process similar to rheumatoid arthritis. Von Dengun and Schneider (*Münch. med. Woch.*, Oct. 25, '98).

From all these experiences it seems demonstrated that micro-organisms are constantly found in the synovia of the diseased joints, but until further experience their significance and mode of action remain uncertain.

Pathology.—In the affected joints there is generally some increase of the synovia, especially in the earlier stages of the disease. The synovial membrane is thickened; in the acute stage is injected and soft, in the chronic stage hard and dense. The ligaments are affected in the same way and in chronic cases often present patches of cartilage; sometimes the patches inserted in the ligaments have a bony basis, while the surface consists of cartilage. The synovial membrane is injected and granular and readily breaks down on pressure, the villi being thickened and more prominent than usual. Small erosions may be found on the cartilage, which presents a velvety appearance. The cartilage ordinarily shows erosions and disappearance of the central tissue, with formation of new cartilage in the periphery. The erosions may be such as to expose the heads, while the proliferation may give rise to the formation of marginal overgrowths. The bones also become much changed, being at first red and injected, soft, and easily broken down. Later on it becomes hard, white, and eburnated. When the bone is exposed, it shows grooves and striæ corresponding to the eminences of the op-

posing articulating surface. Osteophytes are a very common occurrence, bone being formed as well from the cartilage and from the ligaments as from the bone itself. In the cavity of the joints free bodies are often found, formed sometimes by coagulated fibrin or consisting of cartilage or cartilage and bone. These, in most cases, arise from the fringes of the cartilage or have been formed in the ligaments, as mentioned above. In rare cases osteophytes are detached by traumatism and thus form free bodies. By the retraction of the new-formed connective tissue and the changes in all the component parts of the articulations, ankylosis is often caused; but true bony ankylosis is a very rare occurrence.

In the muscles decoloration of the fibres and decrease of the volume of each muscle-fibre is found, whereas the number of the fibres is not diminished.

Heberden's knots are small, rounded growths arising from the phalanges of the fingers, commonly from the third, sometimes from the second; they consist of bony tissue and are covered by a projection of the synovial membrane; they are most frequently found in elderly individuals, but have also been noticed at the age of 40 or 50; they are of frequent occurrence in rheumatoid arthritis, but authors of much experience declare having also observed them in cases of true gout. Neuritis and perineuritis, with the infiltration of small round cells in the nerve-sheaths, have repeatedly been observed.

The red corpuscles of the blood are diminished in number, the hæmoglobin shows a marked diminution, and there is a slight augmentation of the white corpuscles.

Prognosis.—The prognosis is rather good as regards life; but ordinarily the

disease assumes a very chronic course, and it has hitherto been most rebellious to treatment, ankylosis of the affected joints being almost certain. When this affects many joints, the patient is reduced to immobility. Of late the prospects of cure have become somewhat more hopeful, especially when modern treatment is applied at an early stage of the disease, before the pathological changes in the joints and the atrophy of the muscles have progressed too far.

Arthritis deformans, if uninfluenced by appropriate treatment, tends to become worse and worse until the patient is left a helpless cripple. In the earliest stages of the disease there can be no question that the morbid process may be arrested by judicious treatment. If, however, the changes in the joints have gone on to the destruction of cartilage, nothing can be done except to give relief to the distressing symptoms. Patients do not die directly from the disease, but from some intercurrent affection. James Stewart (*Montreal Med. Jour.*, Mar., '96).

Literature of '97-'98-'99.

The prognosis of rheumatoid arthritis is, in general, uncertain. Many cases progress to a condition of hopeless deformity and consequent helplessness, although the general health may not be seriously impaired, and death may take place from some intercurrent affection. In others the deformity and impairment of function are limited in degree. The prognosis is not unfavorable in those cases in which the condition receives early recognition before the permanent lesions have developed. Cuvier R. Marshall (*N. Y. Med. Jour.*, June 19, '97).

Treatment.—The diet, as a rule, is to be nutritious and easily digestible; when fever is present suitable liquid nourishment must be given; all the normal constituents of the food are to be represented in sufficient amount; in many cases codliver-oil is indicated. Stimulants are not so pernicious in rheuma-

toid arthritis as in gout, and may be permitted if necessary. The patients must be directed not to make few and large meals, but to take food often and at regular intervals.

Woolen garments and blankets are very useful, and the patients are to be directed to avoid chills and exposure to dampness and cold. When possible, the sufferer ought to take such exercise as his forces and the state of his joints will permit; the use of pulleys, massage, and passive and active gymnastics are very useful.

In the few cases which occur as a result of acute articular rheumatism salicylic acid and its compounds—salol, salophen, etc.—will be found useful. When these fail, iodine, iodide of potassium, and tinctura colchici are to be tried; the affected joints are to be painted with iodine or enveloped in gauze saturated with methyl-salicylate.

Literature of '97-'98-'99.

Lactic acid used with success in an old case of arthritis deformans. Ten drops of this drug were daily administered upon an empty stomach, no food allowed for an hour and a half afterward. Zolotavine (*La Méd. Mod.*, Sept. 18, '97).

Methylene-blue is particularly valuable in those forms of rheumatoid arthritis due to autointoxication from the intestinal tract. W. Armstrong (*Brit. Med. Jour.*, Apr. 24, '97).

In cases of true rheumatoid arthritis the therapeutics are to be directed principally against the infection by microbes and the toxins secreted by them. Remedies capable of strengthening the forces and the vital energy of the patient are necessary. As powerful antidotes against bacterial invasion, the creasotes, naphthols, and phenols are valuable; of the drugs belonging to this group Bannatyne prefers creasotal, and most of all

the guaiacol-carbonate. Creasotal is a thick fluid, soluble in alcohol, but not in water; it has an oily taste and a rather disagreeable odor, and is given in the dose of 5 or 8 drops thrice a day. Guaiacol-carbonate—a white, crystalline, insoluble, tasteless and odorless powder, which in the bowels is decomposed, yielding guaiacol—is also valuable; it is given in doses of from 5 to 8 grains three to six times a day. The use of the drug ought to be continued for a long time and gives excellent results; it alleviates the pain and combats the morbid process itself. Benzozol (benzoyl-guaiacol) may also be tried.

For external use a host of drugs have been employed to produce irritation of the skin, turpentine, iodine, camphor, and ammonia, for instance. To relieve the pain, chloroform, belladonna ointments, methyl-salicylate, etc., have also been tried. Bannatyne advocates the external use of guaiacol in combination with an equal amount of olive-oil or combined with tincture of iodine (6 parts of guaiacol to 1 part of iodine); the odor of guaiacol can be masked by a few drops of the oil of cloves. The mixture is painted on the affected joint and covered with a dry dressing.

Electrical treatment has been advised, but is not so useful in this disease as in gout. I have tried the dielectric introduction of lithia with a strong galvanic current in many cases, but I do not consider it to be of much value against rheumatoid arthritis. Steavenson and Garrod employ an electric bath, through which a strong galvanic current of 50 to 200 milliampères is allowed to pass for about ten minutes; as many patients are very sensitive to galvanic currents of this force, much circumspection is advisable in the use of this treatment.

Thermal treatment has been employed

for centuries and until recently the current therapy of rheumatic gout consisted principally in advising a cure in alkaline, sulphurous, or in different springs (Bath, Aachen, Wildbad, etc.), and certainly many patients have profited from such a course. Of late the application of hot-air baths has somewhat supplanted the use of water-baths. The apparatus constructed by Tallermann, Betz, Gréville, and many other inventors make it possible to place the affected limb in a hot-air bath at a temperature of 80° to 120° or even 150° C. This bath may be given daily, if the forces of the patient allow it; they produce a very strong perspiration of the part in treatment, and, although more moderately, of the whole body. The bath is very well borne by the patients, their temperature is only slightly raised by it, while the heart is not at all influenced. These baths are of great value to alleviate the pain and to combat the swelling and the stiffness of the joints.

Literature of '97-'98-'99.

The local, hot, dry-air bath is of little value in rheumatoid arthritis; but it is of great service in the treatment of ligamentous inflammations and in tenosynovitis, whether rheumatic or of traumatic origin. The temperature considered of most value was the one ranging between 270° and 320° F. H. C. Wood (*Med. News*, July 17, '97).

In Germany competent observers have advocated a surgical treatment of the disease. Schüller treats the affected joints by repeated injections of a mixture of iodoform, 20 parts; acid-free glycerin, 250 to 400 parts; and guaiacol, 5 parts. The injection is made with every antiseptic precaution. As a rule, the pain continues for some days, but fever only exceptionally results. Twenty-seven cases were treated in this manner; of these sixteen recovered almost com-

pletely. But the cure is more rapidly effected by incision of the affected joint, removal of the diseased synovial membrane and the villous mass, and suturing of the wound with injection of the above-mentioned mixture in the articulation. The joint is kept immovable for ten days and extended by a bandage. After that the sutures and the bandage are removed and massage, electricity, inunctions, and baths are employed. By this method Schüller obtained a complete cure with absolutely normal moveable joints.

Literature of '97-'98-'99.

Acute articular rheumatism that remains rebellious to internal medication tends to show that surgery is a curative agent, and that, the sooner the latter term is dropped and acute infective arthritis substituted, the sooner shall we be in a position to combat it more successfully. The treatment adopted in two successful cases was identical with that indicated in severe cellulitis. O'Connor (*Lancet*, July 8, '99).

Muscular Rheumatism.

Definition.—A rheumatic affection of the muscles, causing pain and stiffness of the diseased muscles, which usually disappears after some days. It sometimes assumes chronicity, being then accompanied by the formation of fibrous bands and nodules in the muscles.

Symptoms.—The principal symptom is pain, which may be spontaneous or caused by movements or pressure of the diseased parts. The pain in some cases is limited to the first muscles affected, but sometimes it suddenly disappears from these and attacks another group of muscles. Fever sometimes attends the disease. The symptoms vary according to the muscles affected. In rheumatism of the intercostal muscles breathing is painful and the disease may be confounded with pleurisy. When the mus-

cles of the abdominal wall are affected, there is excessive tenderness to pressure and the symptoms may resemble those of acute peritonitis; but the absence of fever is of great value as a diagnostic sign. Rheumatism of the muscles of the back occasionally gives rise to opisthotonos, and suspicion of spinal meningitis may arise. Rheumatism of the muscles of the neck causes stiffness, and, when the muscles of one side only are affected, rheumatic torticollis is produced.

When a case of apparent muscular rheumatism does not only yield, but also does not stay improved, after a few massages, then the probability is that the case is one of neuritis affecting the nerve-fibres that supply the impaired muscles. Massage is thus used as a means of diagnosis between muscular rheumatism and neuritis. D. Graham (*Amer. Jour. of Med. Sci.*, Aug., '93).

Literature of '97-'98-'99.

Danger incident to the too-common diagnosis of obscure pain as muscular rheumatism.

In twelve cases of alleged rheumatic wryneck not one was really due to rheumatism. The abnormal position was not caused by pathological contraction of the sterno-cleido-mastoid, but was primary and was assumed to lessen pain: the muscle contracture was secondary and due to position. The pain and tenderness were in all cases on the convex side and not closely related to the muscles. Tenderness was especially elicited over the fourth upper spinous processes. In every instance the lateral flexion of the rigidly-held head could be increased without pain. None of the muscles of the concave side showed increased tonus. Pain was not caused by visible extension of the neck; hence spasm was not the cause of the torticollis. It was evident that the joints of the convex side of the cervical spine were diseased, or that the roots of the nerves passing out at this side were affected.

Two hundred cases of lumbago were observed. In not one was muscular disease noted. In 119 cases there was affec-

tion of the articulations of the lumbar vertebræ characterized by tenderness to pressure over the joints, limitation of lateral flexion and lateral curvature, the concavity of this curvature being toward the sound side. Twenty-one cases were instances of neuralgia of the cutaneous nerves which have their origin in the three lower lumbar branches. The region of the vertebral articulations was not tender. Some were alcoholics, some were beginning tabetics, and one was suffering from osteomalacia. Erben (*Centralb. f. Chir.*, Sept. 10, '98).

The acute form of muscular rheumatism passes away in a few days; the chronic form may continue for weeks and months and often provokes formation of new connective tissue, with its consequence: stiffening of the muscles and contractures. Sometimes small fibrous bands and nodules are formed in the muscles and give rise to much pain and tenderness. Rheumatism of the muscles is in some cases complicated with myositis, which may be general or localized,—limited, for instance, to the muscle of the heart.

Etiology.—Overwork, especially when combined with exposure to cold and dampness, has always been considered as the common cause of the rheumatism of the muscles. Many persons are very sensible to draughts. The disease commonly occurs after the thirtieth year, but is also found before that age. Some individuals have a special predisposition to the disease, and it is very liable to recur in the muscles which once have been affected by it: especially in the muscles of the neck.

In all probability the muscular form of rheumatism is also caused by microbes, but their presence in the affected muscles has as yet not been proved by direct observation.

From observations of two hundred cases of muscular rheumatism, it is concluded that both muscular and articular

rheumatisms are infectious and probably caused by an attenuated form of micro-organism. W. Leube (*Deut. med. Woch.*, Jan. 4, '94).

Literature of '97-'98-'99.

The entrance of a particular attenuated pyogenic organism, invading the tissues through the tonsils, may be the common cause of simple catarrhal angina, or articular and muscular rheumatism, and of the cutaneous manifestation observed in the course of these affections. In addition, many other influences are in action, such as constitutional peculiarity and bad hygienic conditions. The difference in the particular symptom which may arise depends, on the one hand, upon the virulence, more or less marked, of the organism, and, on the other, upon the resistance offered by the structures. Peltessohn (*Archiv f. Laryn.*, etc., vol. vii, Tome v, '97).

Treatment.—For internal use salicylic acid and its compounds are much employed and will sometimes, but not in all cases, bring relief. When the salicylates fail to effect a cure, tincture of colchicum or iodide of potassium may be tried. Externally tincture of iodine and all the rubefacientia—ammonia, camphor, turpentine, etc.—are to be tried; also warmth in the form of hot water, poultices, and hot baths (Russian or Turkish). Of late hot-air baths have been much recommended. The external use of methyl-salicylate often alleviates the pain.

When the disease has passed over to the chronic stage massage and electricity are useful. In cases attended by induration and fibrous nodules in the muscles, characterized often by continuous and very intense pain, excision of the hard nodules of fibrous tissue often gives immediate relief.

Massage recommended in muscular rheumatism. Recent cases are almost invariably cured by a few massages,

while in more chronic cases relief will be hastened by the addition of rest, warmth, and electricity. Douglas Graham (Amer. Jour. of Med. Sci., Aug., '93).

Gonorrhœal Rheumatism.

Definition.—An acute inflammation of one or more articulations occurring during the course of gonorrhœa and caused by invasion of gonococci in the joints.

Symptoms.—Gonorrhœal rheumatism ordinarily appears in the acute stage of the gonorrhœa. In some cases the lesion of the joints is only revealed by arthralgia: *i.e.*, intense pain without swelling. This affection is particularly observed in the small articulations of the foot. The pain is worst in the evening and is aggravated by movements. The arthralgia may also precede the evolution of the gonorrhœal arthritis or continue for some time after the disappearance of the swelling.

In other cases the affected joint becomes the seat of an effusion of fluid, giving rise to no pain or accompanied by very little pain. This effusion disappears very slowly and often leaves a stiffness or fibrous adhesions in the joint. This form of the disease is most frequently observed in the knee.

Ordinarily gonorrhœal rheumatism in its mode of invasion and evolution resembles very much the acute form of articular rheumatism. It differs from that disease by attacking only one or a few articulations at the same time; the affected joints remain involved for a longer time. Again, gonorrhœal arthritis does not migrate so suddenly from one joint to another as the acute articular variety. No joint, however, is immune, and even those which ordinarily escape during the course of rheumatic fever, as, for instance, the articulations

of the jaws and the neck, may be attacked by the gonorrhœal arthritis.

The pain is of extreme intensity. It is aggravated by movements and by pressure over the swelled articulation. Many painful points are also found. The tumefaction is ordinarily very marked; it is caused as well by effusion into the joint and by œdema of the overlying coverings. The skin over the affected joint is hot and tense.

Commonly the patient tries to alleviate the pain by keeping the affected joint semiflexed. If he is allowed to remain in this position, contraction of the extremity may result.

Gonorrhœal rheumatism does not affect the articulations alone. The serous bursæ and the sheaths of the tendons in the proximity of the diseased joint are always involved; sometimes they alone suffer. The muscles of the affected extremity are always affected and generally become atrophied.

In some cases one joint only is attacked; the pain is, then, as a rule, still more excruciating and the effusion greater than in the polyarticular form.

The acute stage of the disease is not, usually, of long duration. After some days or a week the pain declines and the effusion diminishes. The disease rarely disappears completely, however; one or more joints remain somewhat stiff and painful several months.

Suppuration of the joints affected by gonorrhœal rheumatism is a rare occurrence. It only happens when the infection with gonococci is complicated with the invasion of pyogenic microbes. The chronic form of gonorrhœal rheumatism often gives rise to contracture of the joints or periostitis of the epiphyses.

Diagnosis.—The diagnosis is easy when the urethral discharge is still present, but difficult when it is not. The

disease may be confounded with acute articular rheumatism and with osteomyelitis. In gonorrhœal rheumatism only few articulations are attacked at once. The development of the arthritis, the inefficacy of the salicylates, and, if possible, the demonstration of gonococci in the affected joint constitute the main distinctive signs.

Etiology.—Gonorrhœal rheumatism is caused by an infection with gonococci, and it is only observed as the consequence of a gonorrhœal blennorrhagia. Many authors have found the gonococci in material taken from the affected joints or synovial sheaths, and some have even observed them in the blood of the patients. The disease attacks both sexes equally; it may occur in children as well as in adults.

Two newborn infants observed suffering from concomitant blennorrhœa and joint-inflammations. In the secretions from the joints, as well as those from the eyes typical gonococci were found. Gonococci were also demonstrated in a discharge from the mother's urethra. Deutschmann (Schmidt's Jahrbucher, July 15, '90).

Blood taken from five individuals suffering from gonorrhœal rheumatism and all having gonococci in their urethral discharge. From these specimens cultures were made; in three cases the result was negative, but in two bacteria were found having all the characteristics of gonococci and producing a characteristic discharge upon being introduced in the vagina of a bitch. Hewes (Boston Med. and Surg. Jour., Nov., '94).

Literature of '97-'98-'99.

Gonorrhœal rheumatism is a rather frequent disease in children; ordinarily it is monarticular, it may occur in consequence of gonorrhœal conjunctivitis. The disease is of short duration, always ends with recovery, and never causes ankylosis. Yantschuleff (Thèse de Lyon, '98).

Prognosis.—The prognosis as to life is good, very often the disease results in stiffness of the affected joint and weakness of the limb, caused by atrophy of its muscles.

In the great majority of cases gonorrhœal rheumatism in the newborn is monarticular or oligo-articular; the knee is almost constantly involved, much more frequently than with older children and adults. The general condition is little affected, and fever is habitually absent. The duration is scarcely more than a month, and cure results without deformity. Hansbolter (*Révue Mens. des Mal. de l'Enfance*; *Amer. Jour. Med. Sci.*, Jan., '96).

Treatment.—The treatment with drugs given internally is not of great value; the salicylates have no influence on the course of the affection.

Oil of gaultheria is of value in both acute and subacute stages of gonorrhœal rheumatism and comes the nearest to a specific of any of the many remedies used. It may be given in doses of from 5 to 20 drops every two hours in milk. Ichthyol ointment also recommended as a local application. Ramón Guitéras (*N. Y. Med. Jour.*, Mar. 24, '94).

Proper treatment of gonorrhœal rheumatism consists in treating the discharge itself. The gonococci must be destroyed at their point of origin, where they multiply and infect the organism generally. The best means is by permanganate-of-potash irrigations. The treatment is more effective in early cases; but if the joints have been affected for long, it often fails. In such obstinate cases the joints may be injected with 1 in 4000 perchloride of mercury. In suppurating cases arthrotomy is indicated. Rendu (*La Méd. Mod.*, No. 102, '96).

In the treatment of gonorrhœal rheumatism every means should be exhausted for the purpose of shortening the attack of gonorrhœa. So far as internal treatment is concerned, large doses of from 45 to 60 grains of salicylate of sodium combined with one of the balsams are useful. In the chronic cases iodide of

potassium often does good. The local treatment consists in immobilization of the limb, the application of ice-bags upon the painful part, and the application of soothing ointments which also possess a resolvent influence. The following may be used:—

R Salicylic acid,
Oil of turpentine,
Lanolin, of each, 2 1/2 drachms.
Lard, 3 ounces.

In chronic cases counter-irritation, massage, electricity, and turpentine-baths are to be used, and the patient recommended to resort to some hot springs. Should there be considerable effusion into the joint, compression may be used for its absorption, or, if the effusion becomes purulent, it should be carefully aspirated, and by means of the same needle 60 to 90 minims of a 1 to 4000 solution of corrosive sublimate should be injected. Should the articular inflammation become exceedingly severe, an arthrotomy is indicated. Balzer (Jour. des Prat., Apr. 11, '96)

The diseased extremity is to be secured in a proper position, and the pain may be alleviated by poultices, the use of narcotics, ointments of ichthyol, belladonna, etc. When the acute pain has subsided, compression is useful, and after some time the mobility is to be restored by massage, passive gymnastics, baths,—especially hot-air baths,—etc.

The best treatment for gonorrhœal rheumatism is wrapping the joint with a cloth saturated with a solution of bichloride of mercury, 4 grains to the ounce, and surrounding the cloth with oiled silk. Rapid recoveries claimed without internal treatment. C. B. Hutchins (Med. World, Jan., '93).

Literature of '97-'98-'99.

It is advisable in all acute inflammations of the joints to examine the urethra. In 90 per cent. of the cases urethritis will be found. The cases may be divided into four groups: first, where effusion alone occurs; second, where there is formation of fibrin and thickening of the capsule; third, periarticular

phlegmon, with impairment of the action of the tendons and elasticity of the ligaments; fourth, where ankylosis occurs very early. Puncture of the joints and the injection of a solution of carbolic acid advised. If there is a periarticular affection, the joint should be opened and washed out. König (Samml. klin. Vort., No. 70, '96; Boston Med. and Surg. Jour., July 7, '98).

Surgical measures—aspiration, early incision into the joint—have given rise to excellent results. In twenty cases treated by Brès an incision was made into the joint, the diseased synovial membrane was removed, and dilute tincture of iodine or a weak solution of chloride of zinc was injected. All his cases recovered completely.

Cure of an acute, suppurative, blennorrhagic arthritis by aspiration and injection of 3 hypodermic syringefuls of bichloride of mercury (4 to 1000). Rendu (Le Bull. Méd., Mar. 24, '93).

Literature of '97-'98-'99.

Case of gonorrhœal arthritis in which incision was made over the outer edge of the patella, the capsule of the knee-joint was reached by dissection, and 10 ounces of thin, brownish, sero-purulent fluid were evacuated. The cavity was explored with the finger, and several fibrinous flakes turned out; it was then thoroughly flushed with normal salt solution. Sterile wicks were passed through and the cavity again washed out. After the second douching the wound was closed and a dry dressing, with compression, was applied and the limb placed on a ham-splint. The patient was dismissed cured in seventeen days. Homans (Boston Med. and Surg. Jour., Dec. 29, '98).

F. LEVISON,
Copenhagen.

RHINITIS. See NASAL CAVITIES.

RHUBARB.—Rhubarb, or rheum (L. S. P.), is the root of *Rheum officinale* and of other undetermined species of

Rheum (nat. ord., *Polygonaceæ*): a plant indigenous to Asia (China, India, Tartary, and Thibet), but which is cultivated in America and elsewhere. It contains extractive, sugar, starch, pectin, lignin, salts, several unimportant alkaloids, a glucoside, and acids, one of which, chrysophanic acid is used in medicine. In commerce two sorts are recognized,—the Chinese and the European,—the former of which is considered the better. It occurs in irregular cylindrical or conical, flattened pieces, which are generally perforated, are covered with a light-yellowish-brown powder, and have frequently a wrinkled surface. Beneath the powder the color of the root is reddish brown, mottled with lighter hues. The root is dense and hard and has a bitter and somewhat astringent taste and a peculiar aromatic odor. When chewed, the root is gritty (due to the presence of crystals of calcium oxalate), and imparts a yellow color to the saliva. European rhubarb is inferior to the Chinese variety; powdered rhubarb is also inferior, and, if not adulterated, at least is generally made up of inferior, damaged, worthless, or worm-eaten material.

Preparations and Doses.—*Rheum*, U. S. P. (the root), 5 to 30 grains.

Extractum rhei (U. S. P.), 5 to 15 grains.

Extractum rhei fluidum (U. S. P.), $\frac{1}{4}$ to 1 drachm.

Mistura rhei et sodæ, U. S. P. (fluid extract of rhubarb, 15; fluid extract of ipecac, 3; bicarbonate of soda, 35; glycerin, 350; spirit of peppermint, 35; water, sufficient to make 1000 parts), $\frac{1}{2}$ to 2 ounces.

Pilulæ rhei, U. S. P. (rhubarb, 3 grains), 1 to 5 pills.

Pilulæ rhei compositæ, U. S. P. (rhubarb, 2 grains; aloes, $1\frac{1}{2}$ grains; myrrh, 1 grain), 1 to 3 pills.

Pulvis rhei compositus, U. S. P. (Gregory's powder: rhubarb, 25; magnesia, 65; ginger, 10 parts), 1 to 3 drachms.

Syrupus rhei, U. S. P. (fluid extract of rhubarb, 10 per cent.), 2 to 6 drachms.

Syrupus rhei aromaticus, U. S. P. (aromatic tincture of rhubarb, 15 per cent.), 2 to 6 drachms.

Tinctura rhei (U. S. P.), 1 to 4 drachms.

Tinctura rhei aromatica (U. S. P.), $\frac{1}{2}$ to 3 drachms.

Tinctura rhei dulcis (U. S. P.), 1 to 2 drachms.

Poisoning by Rhubarb.—Rhubarb is not generally considered poisonous, but a case has been reported in which the internal administration of rhubarb gave rise to an hæmorrhagic eruption of macules, pustules, and blebs. The mucous membranes were also affected, and free hæmorrhage from the urethra occurred.

Therapeutics.—Rhubarb is an excellent stomachic tonic in atonic dyspepsia associated with deficient biliary and intestinal secretion. It is a remedy especially adapted to those of relaxed habit, but inadmissible when an hyperæmia of the mucous membrane exists (Bartholow).

Rhubarb is a valuable remedy in simple constipation, where we wish to unload the bowels without affecting the general system. The root is often chewed by adults to relieve constipation. In children the syrup is a palatable preparation for this purpose; the pill or compound pill may be used by adults.

Constipation and hæmorrhoids depending upon pregnancy are benefited by the administration of rhubarb.

Literature of '97-'98-'99.

Syrup of rhubarb precipitates ergotine, no matter by what process the ergotine has been prepared. This is owed to the tannin contained in the rhubarb. Edi-

torial (Jour. de Pharm. d'Anvers; Settimana Med., Mar. 25, '99).

In the summer diarrhœa of children, with green stools, the aromatic syrup of rhubarb may be employed to empty the bowel of its fermenting contents before giving direct treatment. The diarrhœa of indigestion in children and adults is relieved by the aromatic syrup or by the mixture of rhubarb and soda.

In children when constipation is replaced by diarrhœa if any ordinary laxative is used, rhubarb is an available remedy on account of its secondary astringent action.

Functional disturbance of the liver with deficient biliary secretion is relieved by the administration of rhubarb, either alone or, better, combined with blue mass.

Rhubarb is an efficient remedy in duodenal catarrh and in catarrh of the biliary ducts with jaundice, especially in children. White, pasty, or clay-colored stools with a skin of an earthy or jaundiced hue are indications for rhubarb.

RUBELLA.—Latin, *rubellus*, reddish.

Synonyms.—Rötheln, German measles.

Definition.—Rubella is an acute, infectious, contagious disease of mild character, presenting somewhat variable symptoms and running a favorable course. Its identity as a disease, *sui generis*, was long doubted. There is now no question, however, that it is a distinct entity among diseases, though it strongly resembles in its different manifestations measles and scarlet fever. No better statement of present beliefs regarding its true character has been made than that of Griffith, which is as follows: “(1) rubella is a contagious, eruptive fever, and not a simple affection of the skin; (2) it prevails independently either of measles or of scarlet fever; (3) its incubation, eruption,

invasion, and symptoms differ materially from both of these diseases; (4) it attacks indiscriminately and with equal severity those who have had measles and scarlet fever and those who have not, nor does it protect in any degree against either of them; (5) it never produces anything but rubella in those exposed to its contagion; (6) it occurs but once in the individual.”

Period of Incubation.—The period of incubation given by different authors is as follows: Holt, 8 to 16 days, the limits being 5 to 22 days; Rotch, 21 days; Edwards, 7 to 14 days; Plant, 1 to 3 weeks; Smith, about 2 weeks. These figures clearly show that the period of incubation is of considerable length and extremely variable. The indefiniteness arises not so much from lack of observation as from variability in the disease. To say that the period of incubation is about two weeks is probably as correct and definite a statement as can be made.

Symptoms.—The symptoms of rubella are extremely variable, so much so in fact that we must agree with Rotch that it is impossible to describe a typical case in such a way that the disease can be certainly diagnosticated in a sporadic case. Many cases, however, run a fairly consistent and characteristic course. The invasion is seldom severe. In some cases there is a prodromal stage lasting a few hours; in others the rash is the first symptom to be observed. The fever is rarely high and often does not rise above 100°, but commonly, when at its height, on the first day of the eruption, it reaches 101° or 102°. It occasionally rises to 104° or more. The drowsiness, stupor, and other evidences of serious illness so frequently seen at the height of measles are rarely, if ever, seen in rubella. A child with a bright and very extensive eruption will frequently show no sign of general illness.

The apyrexia which so commonly attends rubella is an altogether-exceptional phenomenon in measles. If, then, a child affected with a measly eruption is apyretic, rubella may be almost certainly diagnosed. Juhel-Rénoy (*Lancet*, Nov. 11, '93).

In my own experience, sore throat has been the rule. The tonsils and pharynx are red and swelled and there is pain on swallowing. This is occasionally so marked as to be very suggestive of scarlet fever. The vomiting so common at the outset of that disease, however, is rarely present. A secondary sore throat which comes on as the disease is subsiding was first noted by Eustice Smith as very characteristic of rubella. It certainly occurs in some cases. The symptoms of the primary angina subside on the second or third day and rapidly disappear. There are no catarrhal symptoms in most cases, but occasionally slight suffusion of the eyes and a mild catarrh will render the diagnosis from measles more difficult.

Enlargement of the post-cervical and suboccipital glands is a very constant and very characteristic symptom of rubella. Numerous small glands may almost invariably be felt behind the sternomastoid well down toward the shoulder; they rarely become very large and never suppurate. They may be felt most distinctly when the rash is at its height, and disappear rapidly. While they aid materially in diagnosis, and may perhaps be called diagnostic, they are certainly not pathognomonic, for they may sometimes be found in measles and in rare cases may be found in scrofulous children without febrile symptoms.

There is one pathognomonic feature eminently distinctive of rubella. It is an enlargement of the small glands just at the edge of the hair on the posterolateral sides of the neck. This feature has never been absent in any case com-

ing under personal observation. Osborn (*Weekly Med. Review*, Dec. 24, '87).

Enlarged cervical glands are sometimes found in rubeola and sometimes not in rubella. Townsend (*Boston Med. and Surg. Jour.*, Aug. 22, '90).

Experience recorded in three epidemics of rubella. The cases in the first were almost all typical—the eruption, the fever, the enlarged post-cervical glands, and the slight indisposition presenting an array of symptoms pathognomonic of rubella. In the second epidemic there was a close resemblance to measles. The catarrhal symptoms and eruption were very much like measles. The third epidemic closely resembled scarlet fever. J. R. Hillsman (*Memphis Med. Monthly*, Sept., '92).

Though regarding cervical adenitis as almost pathognomonic of rubella, it was noted in an epidemic of measles in 1886 that 24 out of 27 cases exhibited a glandular enlargement exactly similar to it. Swift (*"Reference Hand-book of the Med. Sci."*, '92).

The eruption appears first upon the face or forehead and extends rapidly over the neck, trunk, and limbs. The whole body is usually covered within twenty-four hours. Occasionally the child will wake in the morning with a rash covering the greater portion of the body. In many cases the rash is limited to small areas, the greater portion of the body escaping entirely. It is more constant upon the face than any other region. In some cases the rash continues not more than twenty-four hours, but, as a rule, it is present from two to four days. Itching is common at the outset.

A slight scaly desquamation may follow the disappearance of the rash, but in many cases no desquamation can be detected. This is particularly true when inunction of the body has been practiced.

The eruption consists of papules or maculo-papules of a red or rose-red color. They vary greatly in size, varying from a pin's-head point to a large blotch. This

multiform character is one of the peculiarities of the eruption of rubella. Most of the spots are smaller than those of measles and larger than those of scarlet

with larger and irregular-shaped spots or blotches. It lacks the uniformity of the rash seen in scarlet fever or measles. The rash more commonly resembles that

Most salient features by which one may distinguish rubella from measles and scarlet fever are as follow:—

	RUBELLA.	MEASLES.	SCARLET FEVER.
<i>Invasion</i>	<i>Nil.</i>	Three to five days, with pyrexia and conjunctival and bronchial catarrh.	Twelve to twenty-four hours, pyrexia, headache, and vomiting.
<i>Catarrh</i>	Slight or absent.	Marked conjunctivitis, coryza, cough, etc.	Absent.
<i>Eruption</i>	Appears on face and chest as bright, pink-red maculæ, first under the cuticle, which become raised, with tendency to spread and form irregular patches or become diffuse.	Appears on face as darkish-red, slightly-raised papules; extends to trunk and limbs; papules become confluent, but distribution is more uniform.	Appears on chest as diffuse general redness of skin.
<i>Throat-lesions</i>	Slight swelling and injection of fauces.	Fauces injected.	All the faucial structures acutely inflamed, swelled and red, or ulcerated.
<i>Tongue</i>	Furred.	Furred.	Thickly furred, which begins to strip off in twenty-four or forty-eight hours, leaving raw surface, with enlarged papillæ.
<i>Superficial lymphatic glands</i>	Always enlarged in axillæ, groins, and behind sterno-mastoid muscle in neck.	May be enlarged at angles of jaw and behind sterno-mastoid muscle.	May be enlarged at angles of jaw and behind sterno-mastoid muscle.
<i>Desquamation</i>	Absent or very slight.	Branny.	Characteristic peeling off of large pieces of epithelium.

N. S. Manning (Med. Press and Circular, Feb. 18, '91).

fever. They vary in size on different portions of the body, and even in the same region the rash will be found, as a rule, to be made up of small dots interspersed

of measles and it is frequently impossible to make a diagnosis from it alone. Edwards has recently alleged that he has not seen the rash resemble that of scarlet

fever. That is not my experience. I have frequently seen a rash consisting of small points grouped closely upon a reddened skin that looked extremely like scarlet fever. Search over the body, in such cases, however, will usually reveal small areas of eruption composed of maculo-papules, appearing as large spots. These are commonly found upon the arms, wrists, or hands. I quite agree with those who describe a scarlatinal and a rubeolar type of eruption. I have seen these two types well marked in two children of the same family exposed at the same time, and ill in the same room. The rash of one, consisting of large maculo-papules, very strongly resembled measles; that of the other, consisting of much finer points on a reddened skin, as strongly resembled scarlet fever.

There are three other eruptions than measles and scarlet fever which have a close resemblance to that of rubella: one is roseola simplex, which arises in hot weather, after chill or from indigestion, readily distinguished by the absence of enlarged lymphatic glands; another eruption is that occasioned by the handling of caterpillars; the third is a medicinal eruption occasioned by copaiba. Clement Dukes (Lancet, Mar. 31, '94).

Etiology.—Analogy leads to the belief that rubella is caused by a specific micro-organism, but the germ has not yet been discovered. It is contagious, though not as strongly so as scarlet fever and measles. Its contagious power at times seems to be very slight. It is most contagious when the eruption is at its height. It is rarely, if ever, seen under six months, but after that age no period of life is exempt. It is most common between five and ten years. The recurrence of true rubella is rare. The disease usually occurs in epidemics, which are most common in the spring.

Complications and Sequelæ.—No other infectious disease is so free from complications. This is, in fact, one of the most marked peculiarities of rubella. Even varicella sometimes shows a serious complication: that of gangrene. No such serious symptom is likely to arise in rubella. The pneumonia, otitis, erysipelas, and multiple abscesses, which in rare instances have been reported as accompanying rubella, are perhaps not in every case a complication, but rather a coincidence.

Out of sixty cases of rubella distributed between both sexes, and ranging in age from two to twenty years, thirty were followed by severe catarrhal pneumonia, and thirty by scarlet fever. Greenlee (Arch. of Ped., Oct., '88).

Prognosis.—Death from rubella is extremely infrequent. In the rare cases in which it occurs it is usually the result of some pulmonary disease, occurring either as a complication or as a coincidence.

Treatment.—Rubella requires very little, if any, treatment. Mild treatment appropriate to any febrile condition is permissible, but if the patient is kept in bed while the fever and rash continue, and is anointed daily with oil, further treatment will rarely be required. Symptoms must be treated as they arise. In most cases the disease as such is of but little importance, its chief interest lying in its diagnosis, owing to its resemblance to two more serious diseases.

Epidemics of rubella are characterized by successive outbreaks separated the one from the other by an interval corresponding to the period of incubation. The disease is infectious from the beginning, like measles, and isolation of the patients is too late a measure. The desideratum is isolation of children who have been in contact with cases. These exposed persons should be closely watched, especially from the twelfth

day after exposure, in order that they may be isolated on the appearance of the initial symptoms. Once the disease is over,—i.e., in about eight days,—the patient is no longer dangerous to his neighbors. Disinfection of the room, furniture, etc., unnecessary, the specific microbe being, like that of measles, endowed with a very limited vitality. Sevestre (Lancet, Nov. 11, '93).

Literature of '97-'98-'99.

All indications for treatment of rubella are met by a bland diet, rest in bed during three to four days, and a week's confinement to the house. After two weeks the patients may resume attendance at school. Blaschko (Ther. Monats.; Med. News, Jan. 29, '98).

FLOYD M. CRANDALL,
New York.

S

SALICYLIC ACID AND THE SALICYLATES.

Salicylic acid (ortho-oxy-benzoic acid; acidum salicylicum, U. S. P.) is an organic acid existing naturally in the oils of wintergreen (*Gaultheria procumbens*) and sweet-birch (*Betula lenta*) in combination as methyl-salicylate; its artificial preparation was discovered by Kolbe in 1874, who produced it from carbolic acid, caustic soda, and carbonic-acid gas by the aid of moderate heat, and subsequent treatment with hydrochloric acid. Salicylic acid occurs as a light, fine, white, crystalline powder or as small needles, having no odor and a sweet taste, with acrid after-taste. It is soluble in 2 parts of ether, 2.4 parts of alcohol, 60 parts of cold and 16 parts of warm glycerin, in 80 parts of chloroform, in 14 parts of hot or 450 parts of cold water, in 2 parts of olive-oil (by aid of heat), and in 30 parts of sweet spirit of nitre. Its solubility is increased by addition of the phosphates, citrates, and acetates of the alkalies and borax. Pure salicylic acid should be free from color and from the odor of phenol, and when heated on platinum foil it should leave no ash.

Preparations and Doses.—Acidum salicylicum (U. S. P.), 10 to 30 grains.

Lithii salicylas (U. S. P.), 10 to 30 grains.

Methyl salicylas, U. S. P. (artificial or synthetic oil of wintergreen), 1 to 10 minims.

Phenyl salicylas (salol, U. S. P.), 3 to 15 grains.

Physostigminæ salicylas, U. S. P. (eserine salicylate), $\frac{1}{100}$ to $\frac{1}{30}$ grain.

Sodii salicylas (U. S. P.), 8 to 60 grains.

Administration.—Salicylic acid should not be administered in pill, powder, or capsule, but always in solution, as it is very irritating to mucous surfaces. It is preferably given with ammonium or potassium acetate, potassium citrate, or ammonium phosphate, all of which increase its solubility in water, or it may be given in some syrup, flavored with compound spirit of lavender, or in elixir of orange. H. C. Wood suggests an extemporaneous solution of ammonium salicylate made by mixing 1 drachm of salicylic acid and 5 drachms of syrup, adding aqua ammoniæ in sufficient quantity to dissolve the acid, which yields a finished product of about 6 drachms, one teaspoonful representing about 10 grains of the acid. A similar result may be obtained by administering the acid (10 to 15 grains) in a tablespoonful of spirit of Mindererus (liquor ammonii acetatis, U. S. P.). The sodium salicylate (containing 80 per cent. of salicylic acid) or lithium salicylate may be given in a

strongly-aromatized syrup. Methyl-salicylate, or artificial oil of wintergreen, or the natural oil of wintergreen may be given in emulsion or in capsule. The tinnitus caused by salicylic acid may be relieved by a 20-grain dose of bromide of sodium. Physostigmine salicylate is not used for the same purposes as the other official salicylates, and will be found under **PHYSOSTIGMA**.

Salicylic acid should not be combined with exalgin, as a reaction takes place between them.

Contra-indications.—The use of salicylic acid and the salicylates is contra-indicated in middle-ear disease, inflammation or congestion of the brain or meninges, albuminuria, and renal disease with impaired function, as in pregnancy and Bright's disease.

Physiological Action.—Salicylic acid has an irritant action upon the mucous membranes. When given to man in medicinal doses it produces symptoms simulating cinchonism: a feeling of fullness in the head, tinnitus aurium, and, perhaps, slight giddiness. Larger doses may give rise to headaches, partial deafness, mydriasis, amblyopia, or partial blindness. Moderate doses do not seem to affect the respiration or circulation very much. The respiration is somewhat quickened, owing to an irritation of the pulmonary vagi and probably some stimulation of the respiratory centres; after very large doses failure of respiration occurs through a gradual or sudden depression or paralysis of the centres (Wood). Moderate doses seem to increase arterial pressure slightly by exciting the vasomotor centres and directly increase the cardiac force. Very large doses cause a fall of arterial pressure, due, in part, to direct action upon the heart. The action of salicylic acid upon the nervous system appears to be a depression of the

motor nervous centres, full doses causing, in addition to the head-symptoms noted above, a diminution of the reflexes and, in large doses, epileptiform convulsions by direct action upon the brain. The action of salicylic acid in medicinal doses upon the normal temperature is variable and slight; if fever be present, its lowering action upon the fever is marked. This latter effect is supposed to be produced by inhibiting heat-production and increasing heat-dissipation, but our knowledge upon this point is far from certain. The first effect of an antipyretic dose in fever is profuse sweating, which may appear within fifteen minutes. Very soon the temperature begins to fall, the depression reaching its maximum in about six hours (Justi). Wood believes that the perspiration can scarcely be the only factor in the reduction of temperature, as there appears to be no relation between its amount and the degree of the fall, and it usually ceases before the latter reaches its maximum. Salicylic acid is absorbed and circulates in the blood, probably, as sodium salicylate, and is eliminated chiefly through the kidneys, partly unchanged and partly as salicyluric acid, the green discoloration of the urine being due to indican or pyrocatechin. The salicylates increase the elimination of urea and uric acid (Haig). Large doses of salicylic acid produce an irritant effect upon the kidneys. The action of salicylic acid and its salts appears to be identical.

Salicylic acid diminishes the vital activity of protoplasm. It is a specific in acute articular rheumatism and in gout, showing itself by a special action exercised not upon a cause still unknown in its real essence, but on account of the power of the anatomical element to sustain this cause and react under its influence. This, however, does not exclude a true specific action upon a cause still unknown, analogous to that exercised

by quinine upon the blood-parasites of paludism or mercury upon syphilis. Besides this specific action, which may be called a special antiseptic, there is a general antiseptic one, which may be useful in variola, diarrhoea, diphtheria, and orchitis after blennorrhagia. M. G. Ponchet (*Nouv. Rem.*, No. 3, p. 57; No. 4, p. 89, '96).

Poisoning by Salicylic Acid.—The symptoms of poisoning by this drug are those of an irritant poison. After the ingestion of a toxic dose nausea follows with a burning sensation in the throat, vomiting, and gastric irritability. There is headache, with great distress in the head and serious disturbances of hearing and vision (deafness, ptosis, strabismus, amblyopia, dilated pupils); excessive restlessness, passing into delirium; slow, laboring pulse; at first accelerated and deepened breathing, with extreme dyspnoea (later feeble and shallow); olive-green urine; occasionally albuminuria, hæmaturia, or even suppression of the urine. Sweating is usually profuse. Local evidences of vasomotor depression may be present, such as rapidly-appearing bed-sores at points subjected to pressure and transitory dark-colored spots over the body (Wood). Post-mortem examination in a case of death from salicylic acid revealed a breaking-down of the blood, visceral congestion, and ecchymotic spots upon the serous membranes.

Literature of '97-'98-'99.

Case of a 54-year-old man who had been treated in years preceding for nephritis. Sixty grains of salipyrin were given in four doses. On the next day an eruption appeared upon his scrotum, which became a large, markedly œdematous, infiltrated, red surface. The following day the patient, against advice, repeated the drug. Necrosis of the affected areas followed, and a deep wound-cavity was left which healed under sublimate solutions. The urine showed a notable

amount of albumin. Fedor Schmey (*Ther. Monats.*, H. 3, S. 175, '97).

In some cases the mental disturbance persists for a week or more. The acid acts very unfavorably upon drunkards, violent delirium being a common and early symptom (Wood). When death occurs, it is preceded by great dyspnoea and general convulsions, and is due to respiratory paralysis.

Erythema with œdema, intolerable itching and tingling of the skin, and fever have been caused by large doses of the sodium salt. Other observed effects upon the skin are vesicles, pustules, and patches of ecchymosis.

A form of chronic poisoning may occur in persons exposed to inhalation of the acid, which is marked by a subacute inflammation of the air-passages attended by congestion, swelling, and œdema of the mucous membrane. The swelling of the tracheal mucous membrane may be so marked as to cause stenosis. In these cases iodide of potash has been found beneficial.

Treatment of Poisoning by Salicylic Acid.—The treatment for poisoning by this drug is that for an irritant poison. It will be well to wash out the stomach with warm water and administer strong coffee. Further treatment will be indicated by the symptoms present.

Therapeutics.—Salicylic acid and the salicylates may be used remedially for their antiseptic, antifermentative, antipyretic, antirheumatic, antipruritic, or antihydrotic property.

RHEUMATISM.—As a remedy in acute articular rheumatism, salicylic acid and the salicylates hold first rank by reason of their prompt and uniform relief of the pain, fever, and other symptoms incident to this disease. Several methods of medication are suggested. Ten to 20 grains may be given every hour until 1

drachm is taken, the same dosage being repeated the following day. Fifteen to 20 grains may be given every four hours until marked physiological symptoms appear. Thirty to 40 grains may be given at 7 and 9 P.M., with a glass or two of milk, so that the effects are produced during sleep. An extemporaneous mixture of potassium salicylate may be prepared by dissolving 3 drachms of salicylic acid and 6 drachms of potassium bicarbonate in 2 ounces of cinnamon-water, a teaspoonful of which may be given in a wineglassful of water every two or three hours. Internal medication in this disease may be supplemented by the use of lint wet with a solution of sodium salicylate, wrapped around the rheumatic joint or of an ointment of salicylic acid applied locally, or the joint may be painted with oil of wintergreen or oil of birch. Local absorption of salicylic acid results through the topical use of any of these remedies. After the subsidence of the acute symptoms the salicylates may, with advantage, be replaced by one of the alkalis; the citrate of potash and soda in doses of 30 to 60 grains at bed-time act well in the sub-acute stage. In chronic rheumatism the salicylates seem to be valueless.

Literature of '97-'98-'99.

Salicylate of methyl is more particularly successful in the articular manifestations of rheumatism, especially as a means of relieving pain. The amount of urine should be watched during the administration of this drug. Salicylate of methyl is also of extreme advantage in subacute and chronic rheumatism. The drug is also efficacious in neuralgia, sciatica, some forms of neuritis, herpes zoster, and in the lightning pains of tabes. In cases of orchitis from mumps it has been tried with remarkable results. Schoull (*Jour. de Méd.*, Mar. 10, '99).

In muscular rheumatism the salic-

ylates are useful in relieving the pain. The salicylates are of no value in gonorrhœal rheumatism until the gonorrhœa is cured, when the rheumatism usually ceases without treatment. In rheumatoid arthritis the salicylates are useless. Rheumatic iridochoroiditis and scleritis are, however, markedly benefited by 15-grain doses of the salicylates, given four times a day.

GOUT.—The value of the salicylates in gout is not definitely settled. Sée, Jaccoud, Haig, and others recommend them; Dyce Duckworth claims that they are inferior to colchicum. If given at all, large doses seem to be necessary. The salicylates frequently arrest the pain and are said to favor the absorption of the tophi.

In lumbago, sciatica, and similar maladies salicylic acid is very useful, especially if they are of rheumatic origin.

NEURALGIA.—In neuralgia the salicylates are not as good as phenacetin and similar remedies. In migraine of rheumatic origin the salicylates will not only relieve, but often effect a cure.

In the nervous irritability of gouty or lithæmic patients Brunton advises the use of the salicylates combined with the bromides.

The pains of locomotor ataxia and of peripheral neuritis are often relieved by the salicylates.

FEVERS.—The employment of salicylic acid as an antipyretic in fevers has fallen into disuse. Cold baths and other antipyretic remedies have replaced it.

INFLAMMATIONS.—In quinsy or parenchymatous tonsillitis salicylic acid is a specific, especially if of rheumatic origin. If given early it will relieve the pain and swelling, shorten the period of illness, and prevent suppuration; doses of 3 or 4 grains every hour suffice.

The salicylates are useful in the post-

inflammatory stage of pleurisy, if the effusion be serous in character. The duration of treatment with the salicylates is less than with alteratives, purgatives, or diuretics. For this purpose 1 to 2 drachms are given daily, in divided doses.

GASTRO-INTESTINAL DISORDERS.—The use of the salicylates is suggested by Bartholow in fermentative dyspepsia, catarrhal gastritis with the presence of sarcinae in the vomited matter, in cases of paroxysmal gastralgia, and in gastric dilatation. In gastric catarrh and intestinal flatulence salicylic acid inhibits the formation of gas.

In catarrhal stomatitis and thrush the following, applied locally, is advised: One part of salicylic acid is dissolved in alcohol and added to 250 parts of water.

In dysentery the use of enemata of salicylic acid (1 part to 300 parts of water) lessens the frequency of the stools and destroys the fœtor.

Salicylic acid has been used as an anthelmintic. For the destruction of the *Tenia solium* (tape-worm) 12 grains are taken fasting, followed by a full dose of castor-oil. For the destruction of the *Ascaris lumbricoides* (round-worm) 8 grains may be given every hour until 40 grains are taken; the last dose should be followed by a purge. The *Oxyuris vermicularis* (thread-worm, or seat-worm) may be destroyed by using an enema composed of salicylic acid and borax, of each, 1 drachm; dissolved in 1 pint of warm water. This should be injected while warm. For a child use $\frac{1}{4}$ drachm of the remedies in a half-pint of water.

CUTANEOUS DISORDERS.—Salicylic acid and the salicylates have been used with benefit in various cutaneous disorders. For the relief of eczema and intertrigo a 4-per-cent. ointment may be used. In eczema of the face, in the

moist or weeping stage, the following will be found efficient: Salicylic acid, 5 to 10 grains; powdered starch and oxide of zinc, of each, 2 drachms; petrolatum, $\frac{1}{2}$ ounce. If in the subacute stage stimulation be necessary, the salicylic acid should be increased to 20 or 30 grains.

Parasitic disorders generally yield to salicylic acid in the strength of 1 to 500.

II. Radcliffe Crocker (Lancet, June 8, '95) administered the salicylates in a case of psoriasis accompanied by symptoms of amygdalitis in which the improvement in the appearance of the patches from week to week was very remarkable. He has found the salicylates especially beneficial in cases of psoriasis guttata of extensive and recent development, the very form unsuited for medication by either thyroid extract or arsenic. The development of any gastrointestinal irritation was met by the substitution of an alkaline sedative for a few days and the subsequent resumption of the salicylates in smaller doses.

In the various forms of erythema multiforme, in erythema nodosum, and in lupus erythematosus improvement followed the use of the salicylates. Erythema following horseback-riding or bicycle-riding may be relieved through the use of an ointment consisting of 10 grains of salicylic acid in 1 ounce of benzoated lard.

The itching of urticaria may be allayed by the use of a dusting-powder composed of 5 parts of salicylic acid, 15 parts of zinc oxide, and 30 parts of powdered starch. Chronic urticaria is often relieved by the internal use of 20-grain doses of salicylic acid, three times daily. For pruritus of the vulva and anus the following has been suggested: Salicylic acid, 2 drachms; cacao-butter, 5 drachms;

white wax, 2 drachms; oil of nutmeg, $1\frac{1}{2}$ drachms.

From the use of salicylic acid for hyperidrosis of the feet and hands varying results have been reported. Equal parts of salicylic acid and powdered starch or talc will remove the fœtor.

Corns and warts are best removed by the use of the salicylic-acid plaster-mull of Unna, which consists of from 30 to 50 parts of salicylic acid and 5 to 10 parts of creasote spread upon gutta-percha. A saturated solution of salicylic acid in collodion is a reliable application.

Salicylic acid has been employed as an antiseptic and deodorizer in chronic ozæna, a solution of 1 to 1000 being used as a nasal douche.

Soft chancres and venereal sores may be dressed with salicylic acid in ointment or powder. The ointment may be prepared as follows: Salicylic acid, 20 grains; alcohol, 45 drops; benzoated lard, 2 ounces. For use as a dusting-powder, 1 part of the acid is mixed with 8 parts of powdered starch or chalk.

PRESERVATIVE.—Salicylic acid has been used as a preservative for meat, fruit, wine, beer, and urine; but such uses are not to be commended. While the acid will prevent urine from decomposing, it will sometimes cause the reaction for sugar to appear upon application of the proper test.

Unofficial Compounds and Derivatives.

ALUMINIUM SALICYLATE (salumin) occurs as a reddish-white powder. It is antiseptic and is used as a dusting-powder in nasal and pharyngeal catarrh and ozæna.

ALUMINIUM SALICYLATE, AMMONIATED (soluble salumin) occurs as a yellowish-white powder, and is soluble in 9 parts of water. It is astringent and antiseptic, and is used in inflammatory conditions of the nose and throat, as a dry insuffla-

tion or applied locally in 20-per-cent. solution (50 per cent. of glycerin and 30 per cent. of water).

AMIDOPHENOL SALICYLATE (salophen; acetyl-paramido-phenyl-salicylate). See **SALOPHEN**.

AMMONIUM SALICYLATE occurs in clear, colorless, monoclinic prisms which are soluble in water. It is antirheumatic, antipyretic, germicide, and expectorant. It is used in febrile conditions, bronchitis, etc., in doses of 2 to 10 grains in wafers.

ANTIPYRIN SALICYLATE (salipyrin; salazolon) occurs as a white, crystalline, odorless substance; of sweetish taste, with bitter after-taste. It is soluble in alcohol, benzin, chloroform, ether, and in 250 parts of water. It is antipyretic, antiseptic, and analgesic. It is used in sciatica, rheumatism, influenza, chorea, pleurisy, dysmenorrhœa, and metrorrhagia (especially before the climacteric). Dose, 5 to 15 grains. Maximum daily dose is 60 grains. The nitrites are incompatible with it.

ANTISPASMIN (narceine-sodium, 1 part, and sodium salicylate, 3 parts) occurs as a reddish, slightly hygroscopic, alkaline powder; it contains 50 per cent. of pure narceine and is soluble in water. It is antispasmodic, sedative, and hypnotic. It is used in children's diseases: whooping-cough, laryngismus stridulus, irritative coughs, etc. Dose of 5-per-cent. solution in cherry-laurel water, three or four times daily: under 6 months, 3 to 5 drops; 1 year, 8 to 10 drops; 2 years, 10 to 12 drops; 3 years, 15 to 20 drops; older children take 10 to 20 drops of a 10-per-cent. solution.

BISMUTH SALICYLATE (basic salt; 64 per cent. of bismuth trioxide) occurs as a white, bulky, microcrystalline powder, soluble in acids and alkalis. It is an external and intestinal antiseptic and

astringent. It is used internally in diarrhoea of phthisis and cholera infantum, in typhoid, etc., in doses of 5 to 15 grains. Used externally like iodoform.

BISMUTH SALICYLATE (acid salt; 40 per cent. of bismuth trioxide) occurs as a bulky, white powder, and loses salicylic acid when treated with ether or alcohol. It is an intestinal astringent and antiseptic, and is used in dyspepsia, gastric catarrh, enteritis, cystitis, and disorders of the alimentary canal. Dose, 5 to 10 grains.

BOROSALICYLIC ACID is a combination of boric and salicylic acids in molecular proportions. It is an antiseptic and is used externally, instead of salicylic acid, usually in the form of the sodium salt.

CAFFEINE AND SODIUM SALICYLATE. See COFFEE.

CALCIUM SALICYLATE occurs as a white, crystalline, alkaline powder which is with difficulty soluble in water. It is used, in doses of from 8 to 20 grains, in gastro-enteritis, and in smaller doses in cholera infantum.

CAMPHOR SALICYLATE (43.6 per cent. of salicylic acid; 56.4 per cent. of camphor) occurs in a white powder; soluble in oils, alcohol, very slightly in water or glycerin. It has been used externally in ointment for lupus and parasitic skin diseases, and externally in doses of 1 to 5 grains for chronic diarrhoea and chronic dysentery.

CINCHONIDINE SALICYLATE occurs in colorless, microscopical crystals, soluble in alcohol and very slightly soluble in cold water. Its uses and doses are the same as cinchonidine.

CINCHONINE SALICYLATE occurs in white crystals, soluble in alcohol. It is used in rheumatism, especially in malarious districts, in doses of 5 to 20 grains.

CRESOL SALICYLATE (paracresalol; paracresylic ether of salicylic acid) oc-

curs in a whitish, crystalline powder or in needles, soluble in alcohol and ether, insoluble in water. Used like salol, in doses of 5 to 15 grains (60 grains daily) in cholera, typhoid, dysentery, rheumatism, etc. Meta- and ortho- salts are used in same dose and diseases.

FERRIC SALICYLATE (salicylate of iron) occurs as a dark-brown powder, slightly soluble in water. It is tonic, antiseptic, astringent, and antirheumatic. It is used externally in hæmorrhage and wounds, and is given internally, in doses of 3 to 10 grains (in pills), in diarrhoea, rheumatism, etc.

GUAIACOL SALICYLATE (guaiacol-salol) occurs in white, insipid crystals, having a salolic odor, and soluble in alcohol. It is antiseptic, antitubercular, and antirheumatic, and is used in phthisis, diarrhoea, dysentery, rheumatism, marasmus, chorea, etc., in doses of 15 grains several times daily. Maximum daily dose is 150 grains *per diem*. (See also GUAIACOL.)

MERCURIC SALICYLATE (basic salt; about 59 per cent. of mercury) occurs as a white powder, soluble in solution of sodium chloride and in dilute alkalies. It is antisyphilitic, antigonorrhœal, alterative, etc. It is said to be well borne by the stomach and to produce no salivation and is given internally in syphilis in doses of $\frac{1}{3}$ to 1 grain. It is used externally in chancre, gonorrhœa, and other venereal affections in 1-per-cent. powder or ointment, and as a urethral injection (1-10,000 to 1-2000 in water).

NAPHTHOL (BETA-) SALICYLATE (betol; naphthalol; naphtho-salol; salinaphthol; salicylate of betanaphthol) occurs as an odorless and tasteless, white powder; soluble in boiling alcohol, in ether, and benzin, but insoluble in water and in glycerin. It is an internal antiseptic, antizymotic, and antirheumatic, and is decomposed in the intestines into sali-

cylic acid and betanaphthol. It is given in doses of 4 to 8 grains (in wafers, milk, or emulsion), 4 times daily in intestinal fermentation, cystic catarrh, rheumatism, etc.

PHENOCOLL SALICYLATE (salocoll). See **PHENOCOLL**.

POTASSIUM SALICYLATE occurs as a white, slightly deliquescent powder (must be kept well stoppered), soluble in water and in alcohol. It is antirheumatic, antipyretic, and analgesic. It is used, in doses of 6 to 15 grains, in rheumatism, pleurisy, pericarditis, lumbago, muscular pains, etc.

POTASSIUM SALICYLATE (potassium salicyl-aldehyde) occurs as a yellow, very deliquescent powder, soluble in water and in alcohol. It is used, in doses of 3 to 15 grains, in rheumatism, lumbago, muscular pains, etc. It must be kept well stoppered.

QUININE SALICYLATE. See **QUININE**.

SALACETOL (salicyl-acetol; acetol-salicylic ether) is an artificial glucoside obtained from monochloracetone with sodium salicylate and heat. It occurs in fine, white, shining leaflets of bitter taste; soluble in cold water, 15 parts of alcohol, and in 30 parts of olive-oil. It is antiseptic and antirheumatic. It is used, in doses of 15 to 45 grains (in castor-oil, if desired), in summer complaints, diarrhœa, dysentery, rheumatism, gout, etc.

SALACTOL (salaktol) is obtained from sodium salicylate, sodium lactate, and a 10-per-cent. solution of hydrogen dioxide. It is used in diphtheria as a local application, internally in tablespoonful doses every two or three hours, and diluted with its own bulk of water as a gargle or spray.

SALICYL-ACETIC ACID (salicyl-oxy-acetic acid) is a reaction-product of sodium salicylate in soda solution with sodium

monochloracetate, and occurs in lustrous leaflets, which are soluble in boiling water and alcohol, and slightly soluble in cold water, ether, chloroform, and in benzene. It is an antiseptic like salicylic acid.

SALICYLAMID, obtained from methyl-salicylate by dry ammonia, occurs in yellowish-white or colorless, thin, transparent, tasteless, but gritty, plates. It is soluble in alcohol, ether, chloroform, and in 250 parts of water. It is antiseptic, analgesic, antipyretic, and is used, in doses of 3 to 5 grains, in solution, in rheumatism, fevers, chorea, gout, etc. The maximum daily dose is 15 grains.

SALICYLBROMANILID (salbromalid; antinervine) is described as a combination of bromacetanilid and salicylanilid. Ritsert believes it to be a mixture of ammonium bromide, salicylic acid, and acetanilid (1:1:2). It should not be given in quantities containing more than the average dose of acetanilid.

SALICYLIC ALDEHYDE (salicylous acid; ortho-oxybenzaldehyde) is obtained from phenol by potassa with chloroform. It occurs as a yellow oil, forming large crystals at 68° F., and has an aromatic odor. It is soluble in water, alcohol, and ether.

SALICYL-PARAPHENETIDIN (salicylidene paraphenetidin; malakin; contains 50 per cent. of salicyl-aldehyde) occurs in fine, bright-yellow needles; soluble in hot alcohol, in solutions of alkaline carbonates, slightly in cold alcohol, and insoluble in water. It is antipyretic and analgesic, and slower in action than antipyrine or acetanilid. It has been used in fevers, rheumatism, neuralgia, etc., in the dose of 15 grains several times daily.

SALICYL-RESORCIN (tri-oxy-benzophenone, resorcin-salol) is obtained from resorcin by phenyl-salicylate. It is an antiseptic, and is used in intestinal inflammations, diarrhœa, dysentery, ty-

phoid fever, rheumatism, etc., in doses of 3 to 9 grains.

SALICYL-SULPHURIC ACID (sulphosalicylic acid) occurs in white crystals, soluble in water and in alcohol. It is used as a delicate and precise test for albumin in urine.

SODIUM BOROSALICYLATE (borosalicyl) occurs in white powder, soluble in water. It is antiseptic, antirheumatic, and analgesic. It is used, in doses of 5 to 15 grains, in rheumatism, gout, scarlatina, pleurisy, and chorea. Also used externally, with glycerin, lanolin, vaselin, etc.

SODIUM DIHODOSALICYLATE occurs in white leaflets or needles, soluble in 50 parts of water. It is analgesic, antipyretic, and antiseptic, and is used externally in parasitic skin diseases.

SODIUM DITHIOSALICYLATE (ALPHA-) is a yellowish-white powder, soluble in water, but less so than the beta-salt. It is an antiseptic and germicide. Used by veterinarians in foot-and-mouth disease.

SODIUM DITHIOSALICYLATE (BETA-) is a grayish-white, hygroscopical powder, soluble in water. It is used internally, in doses of 1 to 10 grains, in sciatica, rheumatism, etc.

STRONTIUM SALICYLATE occurs in octahedral crystals, and is soluble in water and in alcohol. It is used, in doses of 10 to 40 grains, in rheumatism, gout, chorea, muscular pains, and pleurisy.

THEOBROMINE AND LITHIUM SALICYLATE (urophorine "S") occurs in white powder. It is used as a diuretic and nerve-stimulant. It is given, in doses of 5 to 15 grains (maximum dose, 60 grains daily), in dropsy, nephritis, and diseases of the heart and genito-urinary organs.

THEOBROMINE AND SODIUM IODOSALICYLATE—containing 40 per cent. of theobromine, 21.6 per cent. of sodium iodide, and 38.4 per cent. of sodium salicylate—occurs as a white powder, soluble in hot

water. It is a heart-stimulant, diuretic, and alterative. It is given, in doses of 4 to 8 grains, two to six times per day (in capsules or wafers), chiefly in aortic insufficiency.

THEOBROMINE AND SODIUM SALICYLATE—containing 49.7 per cent. of theobromine, 38.1 per cent. of salicylic acid—occurs as a fine, white, odorless powder, which decomposes on exposure. It is soluble in hot water, hot dilute alcohol, and soda solution. It is used, in doses of 15 grains, five or six times daily (in powder, pill, or in peppermint-water), in heart disease, nephritis (especially of scarlet fever), in dyspnoea, and in coughs.

THIERSCH'S SOLUTION contains salicylic acid, 1 part; boric acid, 6 parts; dissolved in 500 parts of hot water. It is a bland, harmless, antiseptic fluid, and may be freely used without fear of poisoning from its absorption.

THYMOL SALICYLATE (salithymol) occurs as a white, sweetish, crystalline powder, soluble in alcohol, ether, and slightly soluble in water. It is an antiseptic. Clinical data are lacking.

TOLIPYRIN SALICYLATE (tolysal; tolyl-antipyrine salicylate; para-tolyl-dimethyl-pyrazole salicylate) occurs in small, almost colorless, or faintly-red-dish, crystals, of an astringent, bitter taste. It is soluble in alcohol, acetic ether, ether, and very slightly in water. It is used in acute and chronic rheumatism, rheumatic neuralgias, etc. The antipyretic dose is 15 grains every half to one hour; as an antineuralgic, 15 to 45 grains every hour or two; for rheumatism, 7 to 15 grains every two hours.

SALIVARY GLANDS. DISEASES OF.

Xerostomia (Dry Mouth).—**SYMPTOMS.**—Arrest of the salivary or buccal secretions was first studied by Hutchinson in

1887. Since then about 40 cases have been recorded. The tongue appears red, devoid of epithelium, cracked, and absolutely dry. The inside of the cheek and the hard and soft palates are also dry, and the mucous membrane is smooth, shining, and pale (Seifert). Diminution in the nasal and lacrymal secretions has also been noted, as well as dryness of the skin and crumbling or falling out of the teeth. The urine is normal. The general health and the digestion are unimpaired, but swallowing and articulation are difficult, owing to the absence of moisture. The disease usually reaches its greatest intensity rapidly, and may then remain without change for years. It usually persists until the patient dies.

ETIOLOGY AND PATHOLOGY. — Xerostomia is almost always met with in women, and about one-half of the cases occur in subjects past fifty years of age. It sometimes follows a shock. It is usually ascribed to defective nerve-function, many patients showing distinct evidences of nervous disturbance: hysteria, hypochondria, anuria, etc. In some it appears to result from mere arrest of function without impairment of the general health. In 36 cases studied by A. J. Hall (*Quar. Med. Jour.*, vol. vii, p. 26, '98) the state of the salivary glands and ducts was as follows: In 8 cases the parotids were enlarged, either equally or unequally. In 3 they were tender and painful; in 4 they were not so; and in 1 the gland ulcerated through into the mouth. In 5 cases enlargement varied from time to time; in 1 of these enlargement was most marked at the menstrual period. With 1 exception, other neighboring salivary glands were not enlarged.

TREATMENT. — Pilocarpine has been used with some success in these cases, but the condition usually recurs. Black-

man employs the drug in $\frac{1}{20}$ - to $\frac{1}{10}$ -grain doses, in a gelatin lamella, which is placed on the tongue and moistened with water.

Literature of '97-'98-'99.

Case of xerostomia, or dry mouth, in which pilocarpine afforded relief for a time; its effects, however, soon passed off; the same was true of arsenic; and, after three and one-half years of observation, the man's condition was changed but little. A. J. Lartigau (*Med. News*, Oct. 29, '98).

Ptyalism. — Excessive secretion of saliva occurs as a symptom of rabies, the various forms of stomatitis, especially the mercurial form, dentition, various gastric disorders, etc.; but as an idiopathic disorder it is rarely met with. It is often observed in neurotic subjects, especially children, and usually disappears after a few years, when the development of the subject has become equalized. It occasionally attends pregnancy (*q. v.*), and may occur during menstrual periods and various febrile disorders, particularly small-pox. The effects of pilocarpine, mercury, iodine, copper, and other agents in causing ptyalism are well known.

TREATMENT.—The general health requires attention, the idiopathic form being, in reality, a manifestation of debility. Weak astringent washes, or a saturated solution of potassium chlorate, may be tried. The galvanic current, the positive pole being applied in the mouth while the latter is full of water, the negative pole being placed over the thyroid cartilage, may prove of value if used daily.

Symptomatic Parotitis. — This is an inflammation of the parotid gland occurring as a result of septic infection through the blood or through the buccal secretions, in the course of various affections, and often ending in ulceration. It may be acute or chronic. It is oftenest met

with in typhoid fever, pyæmia, pneumonia, influenza, puerperal fever, erysipelas, and other infectious disorders. Inflammation of the testicles is another cause, especially when the process is gonorrhœal. Injuries of the alimentary canal and of the testicle or pelvic organs may also give rise to it. Parotitis may follow abdominal operations, especially ovariectomy, hysterectomy, and laparotomy for peritonitis. It has also been observed in cases of neuritis and facial paralysis.

SYMPTOMS.—In the acute form the gland rapidly swells. The temperature becomes raised to 103° or 104°. The whole face becomes enlarged, when both glands are involved, and the lids œdematous. The pain is sometimes very severe, owing to the tense capsule with which the gland is surrounded. Pus-formation promptly follows in the majority of cases, and the pus may burrow in various directions,—the auditory meatus, the thoracic cellular tissue, the retropharyngeal tissues, the maxillary joints, etc.,—and cause serious lesions if not promptly evacuated by incision.

In the chronic form—which may result from mumps, neighboring inflammatory processes, syphilis, the excessive use of mercury, etc.—the gland is also enlarged, but less painful, and may remain so several years.

TREATMENT.—As soon as pus is detected an incision following the course of the facial nerve, or where the abscess seems to “point” (following, if possible, any crease the face may show, to avoid disfigurement) should be practiced. The incision must be sufficiently free to thoroughly evacuate the abscess. Anæsthesia should be employed if possible, to insure operative thoroughness. The medical treatment is that indicated for mumps.

Salivary Calculus.—Salivary concretions of various sizes sometimes form in the parotid gland and its duct,—Stensen’s,—causing inflammation of the organ, retention of saliva, and enlargement of the organ. The majority of calculi, however, are found in Wharton’s duct: the duct of the maxillary gland. Foreign bodies—which, as shown by Desmartin, frequently enter Wharton’s duct—often act as nuclei. Klebs and Waldeyer contend that masses of micro-organisms are the most common causes of salivary calculi, the phosphates and carbonates of lime, magnesia, soda, etc., being deposited around them. The stones may become as large as eggs, and multiple, and are occasionally faceted. In some cases the inflammatory phenomena proceed to abscess-formation, and, spontaneous rupture’s taking place, a salivary fistula is formed. In the case of Stensen’s duct the opening is opposite the second molar of the upper jaw. Wharton’s duct opens beneath the tongue under the frænum. Both openings can be penetrated with a probe, or a fine needle may be inserted into the mass and its contents thus recognized.

One hundred and ninety-six cases of salivary calculus have been reported. This condition is at times mistaken for a dermoid, lipoma, ranula, or malignant tumor. Lindemann (*Deut. med. Woch.*, No. 41, p. 683, ’95).

TREATMENT.—It is sometimes possible to remove a small calculus through the canal; but, as a rule, it is necessary to thoroughly anæsthetize the part with cocaine and to remove the mass by an incision through the oral tissues.

The following procedure is recommended for the cure of salivary fistula connected with Stensen’s duct: Everting the cheek with the thumb on the inside and the finger on the outside, a curved needle armed with a silk thread is carried beneath and around the duct,

a short distance posterior to where it opens into the mouth, both the entrance and the exit of the needle being on the mucous surface of the mouth, and not deep enough to reach the integument of the cheek. The needle is now detached from the thread, and the ends of the latter, after being tied together, are brought out of the corner of the mouth and secured to the outside of the face by a strap of adhesive plaster. As the thread ulcerates its way through the included tissues, the duct is separated from the cheek, causing the saliva to flow into the mouth, and is quickly followed by closure of the fistulous orifice on the cheek. Agnew (University Med. Mag., July, '91).

Tumors of the Salivary Glands.—

CYSTS.—Cystic dilatation of the parotid and maxillary glands or of their ducts is occasionally observed, as a result of a superficial inflammatory process or of cicatricial stenosis of the orifices. In a case noted by Stubenrauch the growth—a parotid cyst—was found studded with tubercular nodules. Stensen's duct may become inflated with air through forcible air-pressure—such as that accompanying the playing of wind-instruments, glass-blowing, etc.—and simulate a cyst.

In many of these cases it is necessary to remove the sac-wall after evacuating the contents by incision.

TUMORS OF THE PAROTID.—Tumors of the parotid are often the result of implication of the glandular tissues in neoplasms of neighboring structures. They may arise in the gland itself, however. Almost any variety of growth, especially adenoma, fibroma, chondroma, myxoma, and the malignant varieties—sarcoma and carcinoma—may be encountered.

The removal of the entire gland for large malignant growths necessitates a grave operation, owing to the proximity and frequent involvement of the external carotid, the internal jugular vein, and other important vascular and nervous

structures. For this reason, large malignant neoplasms are removed with difficulty and often imperfectly. An old and good rule in such cases is to remove moveable growths: *i.e.*, those which are not firmly fixed to the underlying tissues. Benign tumors can usually be successfully extirpated. After the first free incision is made the mass should as much as possible be removed by the fingers. The facial nerve and the temporo-maxillary are thus less exposed.

TUMORS OF THE MAXILLARY GLAND.

—This gland may be the seat of any of the forms of tumor met with in the parotid, but, like it, is often involved in growths that develop in the neighboring structures, especially carcinoma of the inferior maxillary. The mass usually projects beneath the jaw. The removal is not as difficult as in the case of tumors of the parotid, the facial and lingual arteries, which are easily tied, and the lingual and hypoglossal nerves, which can easily be avoided, offering no obstacle to a thorough operation. Here, also, however, it is always best to use the fingers to decorticate, as it were, the growth after incision of the superficial tissues.

Literature of '97-'98-'99.

Clinical, microscopical, and pathological study of the various tumors that occur in the salivary glands. Summary: 1. The capsulated tumors of the salivary gland, and probably those which involve them from other portions of the cranium, consist of epithelial elements and a stroma that is of the nature of bone-cartilage. 2. They are benign when they present an organic arrangement, as, for instance, the epithelium and connective tissue of a gland. They are malignant when this order is altered, and the epithelium, either from trauma or by operation, is found in a wrong relation to the surrounding tissues, as in the connective tissue of the parotid gland. It develops, then, without the

early characteristic stroma. The latter is also wanting when the tumor is malignant. 3. Both components of the tumor—the epithelium and the stroma—develop from embryonal tissue in the Cohnheim sense. In the embryo the conditions for a common development are present, as the parotid as well as the submaxillary gland, before they are encapsulated, lie with individual acini close and firm in the periosteum of the inferior maxilla: *i.e.*, in the perichondrium of Reichert's cartilage. The cylindrical epithelium comes undoubtedly from the gland itself, perhaps also the pavement-epithelium, perhaps from the elongated layer of cells. Hinsberg (*Deut. Zeit. f. Chir.*, B. 51, H. 3 and 4, '99).

SALOL.—Salol (U. S. P.), or phenol salicylate, is the salicylic ether of phenol, or the phenylic ether of salicylic acid. It is a reaction-product of salicylic acid with phenol and phosphorus pentachloride. It occurs as a white, crystalline, almost tasteless powder, having a faint, aromatic odor. It is soluble in 0.3 part of ether, in chloroform, in 10 parts of alcohol, and in benzin and the fatty oils, and insoluble in water. Salol contains 60 per cent. of salicylic acid and 40 per cent. of phenol (carbolic acid), which fact should be remembered when prescribing it.

Dose and Physiological Action.—The ordinary dose of salol is from 3 to 15 grains. As an antipyretic, the dose should be somewhat larger: from 30 to 45 grains. These larger doses are, however, not advised, on account of the danger of carbolic-acid poisoning.

Ewald (*Berl. klin. Woch.*, xxvi, p. 975, '89) states, as the result of experimental research, that salol is not decomposed in the stomach, but immediately upon its entrance into the intestines it comes in contact with the pancreatic juice, and is broken up into its original constituents, —salicylic acid and phenol,—the prod-

ucts of decomposition appearing almost at once in the urine in the form of salicyluric acid, which yields a red precipitate with chloride of iron. Ewald proposed taking advantage of this fact in order to determine the rate at which food passes from the stomach. After free use of salol the urine becomes black from the products of destruction of carbolic acid, and it is capable of causing the symptoms of poisoning by salicylic acid and by carbolic acid, but is said to be less powerful as a poison than are its un-united ingredients, probably because it is broken up slowly and perhaps escapes in part unchanged (H. C. Wood). P. Cornet (*Progrès Méd.*, Oct. 29, '92) has found that it increases nitrogenous elimination.

Poisoning by Salol.—Salol owes its poisonous properties to its constituents, carbolic acid and salicylic acid, chiefly the former. The relative infrequency with which it has caused death is probably due to the reasons above suggested by H. C. Wood. Salol is absorbed slowly, but is also eliminated slowly; so that there is danger of accumulation in the system, if given too frequently, unless diarrhœa be present. It would follow that larger doses would be accompanied with less danger in the latter cases.

Literature of '97-'93-'92.

The importance of the formation of salol calculi, apart from the serious symptoms to which they may give rise, lies in the fact that the activity of the drug is markedly diminished. The chief fault seems to be in the method of administration. Salol—and the same thing holds good for other insoluble bodies of similar melting-point—ought to be rubbed up with some innocuous powder, or given in the form of an emulsion, as recommended by Sahli. C. R. Marshall (*Brit. Med. Jour.*, July 10, '97).

Josias reported the case of a young girl

in whom a large patch of scarlatiniform erythema, together with rose-colored papules and spots resembling those of measles, appeared upon various portions of the body after taking 45 grains. The insufflation of salol for the relief of otorrhœa has caused extreme swelling of the external auditory meatus, the isthmus of the fauces, and of the uvula. Josephowitsch reports a case in which 350 grains had been given in four days, where intense albuminuria and violent pains in the loins appeared. Hesselbach claims that salol is dangerous and contraindicated when renal disease is present, on account of the untoward action of carbolic acid upon the renal cortex. He reports a death of an adult after taking 120 grains for acute rheumatism within eight hours. Chlapowski reports a case in which death apparently followed the ingestion of 15 grains (Nowiny Lekarske, No. 4, '90). It is recommended that a soluble sulphate, as Glauber's salt, be given during the administration of the drug to a patient who is either weak or possesses an idiosyncrasy to the use of carbolic acid.

The powerful action of salol against microbes is due to its splitting up, in any alkaline medium, into salicylic and sulpho-carbolic acids. Its internal use requires caution in fevers, in acute or chronic diseases of the kidney, and arthritic cases with cuticular congestions. Manceau (Thèse de Paris, No. 159, '96).

Therapeutics.—Salol was introduced into medicine, and is now used, as a remedy for rheumatism to take the place of salicylic acid in those cases where the stomach is irritable and will not tolerate the latter. Its applicability is similar to that of salicylic acid. It is useful in acute articular rheumatism, in muscular rheumatism, and myalgia due to exposure. It may be used alone or combined with phenacetin or other remedy.

Its analgesic properties are also manifested in the alleviation of the pain in migraine, various forms of neuritis, and locomotor ataxia.

Gouguenheim and Caport value highly the internal use of salol in pharyngeal inflammations, 5 grains (alone or combined with equal parts of terebene in capsule) three times daily affording relief, especially in those cases of chronic pharyngitis which are incident to the uric-acid diathesis. Combined with terpin hydrate (3 grains of each), it has been found useful in the treatment of bronchitis, catarrhal fever, and colds generally (S. Solis-Cohen). In influenza the combination of salol with phenacetin or acetanilid will relieve the pains and discomforts attendant upon that disease.

Salol has been found of greatest value in the treatment of duodenal catarrh and catarrhal jaundice. In hepatic catarrh, when there is a tendency to inspissation of the bile and in cholelithiasis, salol appears to render the bile more fluid and relieve the general symptoms. In these cases 10 grains are given three times daily.

Gonorrhœa in all its stages is amenable to salol. Being excreted by the kidneys, the urethra is sterilized by the antiseptic urine at every micturition. Salol may be combined with copaiba or sandalwood oil, which it dissolves without difficulty. J. William White, in recent urethritis, recommends the following in a capsule 4 to 6 times daily:—

- R Salol, 3 $\frac{1}{2}$ grains.
- Oleoresin of cubebs, 5 grains.
- Balsam of copaiba (Para), 10 grains.
- Pepsin, 1 grain.—M.

In a majority of cases he also uses an injection of 2 grains of zinc sulphocar-

bolate in a 10- to 15-per-cent. solution of hydrogen dioxide.

Good results follow the use of salol in all affections of the bladder and urethra. It is especially beneficial in pyelitis, cystitis, and fermentation of urine in the bladder, by reason of its antiseptic action upon the urine. Five grains every three or four hours, or 10 grains thrice daily, appear to be sufficient in these cases.

Salol has been used extensively in intestinal disorders. Intestinal indigestion and fermentation are amenable to salol alone or in combination with bismuth, chalk, etc. Diarrhœa due to decomposition is arrested; the summer diarrhœa of children, dependent upon indigestion and consequent fermentation, is checked by salol by reason of its antiseptic action upon the intestinal canal and its contents. Fussell commends the following mixture in cases of cholera morbus:—

R Salol, 1 drachm.

Bismuth subnitrate, 2 drachms.

Chalk mixture, enough to make 3 ounces.

M. Sig.: A dessertspoonful to be taken every two hours.

Good results have been reported from the use of salol in Asiatic cholera. Girode, however, has shown that salol is apt to increase the gastric disturbance which accompanies cholera, and cautions against its use in this disease and in all in which ulcerous conditions of the alimentary tract are present.

Mild or pernicious anæmia is greatly benefited by salol when dependent upon the development of decomposition-products.

Salol and antipyrine combined have been used successfully by Labadie-Lagrave for the control of uterine hæmorrhage. Equal parts of these two substances are heated together in a test-

tube over a lamp until a deep-brown mixture forms. As soon as it is sufficiently cool, a film of cotton on an applicator is dipped into it and passed within the uterine cavity. This is repeated two or three times in succession. The applications are painless and are not followed by unpleasant effects; a second application is seldom needed. In fungous endometritis the applications are made after curetting, and are found to be antiseptic, hæmostatic, and tend to prevent relapse.

The employment of salol as a coating for pills designed especially for enteric medication should receive mention.

Salol has been used externally as a dressing for wounds, burns, and ulcers, as an antiseptic and deodorant, similarly to iodoform, in the form of gauze, dusting-powder (1 part to 1-3 parts of starch or French chalk), collodion (4 parts to 4 parts of ether and 30 parts of collodion), and of 5- to 10-per-cent. alcoholic solution (with 20 volumes of water for gargling in angina, pharyngitis, etc.), or dissolved in oil, balsam, or in ointment. In ointment and dusting-powder it has been found beneficial in impetigo, eczema, and sycosis (Saalfeld), and has been used as an insufflation for the relief of ozæna.

A mixture of salol and iodoform, which, on heating, becomes liquid, and remains so for fifteen or twenty minutes at the temperature of the body has been used in irregular cavities, cold abscesses, fistulas, and bone-cavities, for the purpose of obtaining asepsis. Reynier (*Sem. Méd.*, No. 19, '96).

Capitan claims to abort acute coryza by using an insufflation into each nostril of the following powder:—

R Salol, 15 grains.

Salicylic acid, 3 grains.

Tannic acid, 2 grains.

Powdered boric acid, 1 grain.

This should not be used too freely, as it is not free from caustic action; not too frequently, and not longer than a few hours at most.

Five-per-cent. alcoholic solutions with various flavoring agents are used in the preparation of dentifrices, mouth-washes, and other toilet preparations.

CAMPHORATED SALOL. — This is prepared by mixing 3 parts of salol and 1 part of powdered camphor, heating gradually to complete fusion and filtering. It occurs as a colorless oily liquid, soluble in alcohol, ether, chloroform, and oils. It should be preserved in yellow, hermetically-sealed bottles. This substance is a local anæsthetic, antiseptic, and analgesic. It has been found useful in tooth-ache, earache, suppurative otitis media, neuralgia, rheumatism, typhoid fever, and gastric affections. The dose for internal administration is from 3 to 10 grains.

Bowen says that camphorated salol is of special value in the treatment of furuncles and carbuncles. After it has been applied locally for twelve to twenty-four hours the pain diminishes, the redness and inflammation disappear, and the tumor becomes smaller, without the production of pus. If suppuration be present, lay open freely and cover with cotton compress soaked in camphorated salol; an impermeable dressing is placed over all and secured with a bandage. (*Boston Med. and Surg. Jour.*, Sept. 19, '95.)

SALOPHEN. — Salophen (acetyl-paramido-phenyl salicylate) contains 50.9 per cent. salicylic acid. It occurs in fine, white, odorless and tasteless scales; soluble in alcohol, ether, alkalies, and hot water, and nearly insoluble in cold water. It is not official.

Salophen was introduced as a substi-

tute for salicylic acid and salol by P. Guttmann (*Berl. klin. Woch.*, No. 52, '91). It is said to be less poisonous than salol or salicylic acid, because the phenol of the latter remedies is replaced by an innocuous compound of phenol.

Dose and Physiological Action.—Salophen, like salol, seems to suffer no action until it reaches the intestines, when the pancreatic juice splits it up into its component parts, salicylic acid and acetyl-paramido-phenol. As the latter appears innocuous, the further action of salophen is that of its contained salicylic acid. It has, however, certain advantages over the latter in that it is unirritating and tasteless and is not depressing. It may be given for considerable periods of time without causing nausea, anorexia, tinnitus, or other unpleasant symptoms. It possesses antiseptic, antipyretic, and analgesic properties, and is given in doses of from 5 to 15 grains. The maximum single dose is given as 20 grains; not more than 90 grains should be given during the twenty-four hours.

Literature of '97-'98-'99.

The results of a long series of observations on the use of salophen show that it is three times less toxic than salol. When taken by the mouth it passes through the stomach unaltered, and it is only in the intestine, when exposed to intestinal and pancreatic secretion, that it breaks up. The salicylic acid uniting with glycol is largely eliminated in the urine, either as nascent salicylic acid or as salicylate of sodium. The acid phenol unites to the radical H_2SO_4 , forming a sulphate with that body. A certain amount of salophen is eliminated unchanged. There is evidence of the slow decomposition undergone by this substance, so that the organism is continually under its influence. There seem to be very few instances of intolerance, and bad effects are also very rare. Salophen is free from smell or taste, and the most convenient method of adminis-

tration is in cachet. Baqué (Jour. de Méd., Sept. 10, '97).

Therapeutics.—The therapeutics of this remedy are the same as those of salol and salicylic acid. It is given in the same cases, and in similar doses, and is generally to be preferred to either of them, for the reasons given above. It is well suited, also, for use in diseases of children.

The use of salophen avoids the toxic effects produced by some of the other salicylic compounds. Fourteen cases of acute rheumatism were treated in the Bellevue Hospital by means of salophen, the drug being administered in 15-grain doses, along with 15 grains of sodium bicarbonate, every four hours. Analyzing the cases,—excluding two, on the ground that the temperature was produced by other factors than acute articular rheumatism,—the average duration of fever, after beginning to use salophen, was five days. According to Dr. Whipman, the average duration of fever in 173 cases, treated with salicylates, was 8.65 days.

There were no symptoms of gastric irritation, cardiac depression, or renal or cerebral involvement in any of the salophen cases which could be attributed directly to the drug. Pearse (N. Y. Med. Jour., Mar. 14, '96).

Literature of '97-'98-'99.

Salophen has a most favorable influence upon psoriasis. The left leg of one patient was treated with 10-per-cent. chrysarobin-traumaticin, and the right leg with 10-per-cent. salophen salve. The better result was obtained with the latter method. Lehmann (Ther. Woch., Sept. 26, '97).

Salophen exerts an incontestable action upon acute and subacute rheumatism, but its effects are less constant than those of salicylate of sodium. In chronic and blennorrhagic rheumatism it has not shown itself superior to other drugs. Salophen possesses a powerful analgesic action, which is exercised even in those cases where this drug cannot be looked for to effect a cure. It has given good results in migraine, in various neuralgias, and in sciatica. Salophen em-

ployed in a medium dose produces no phenomena of intolerance, nor does it occasion headache, buzzing in the ears, or troubles of vision, but intolerance appears to be rapidly induced. In certain cutaneous affections salophen appears to have some efficacy. The medium dose of salophen is 60 grains daily, more or less, according to the gravity of the complaint. Creslé (Gaz. Hebdom. de Méd. et de Chir., Dec. 18, '98).

Salophen is harmless in daily amounts of from 45 to 90 grains. Since it is odorless and tasteless, it can be administered as a powder, in compressed tablets with starch or sugar of milk, or as pills. It passes through the stomach unchanged, without producing any gastric disturbances, and in the intestine is so slowly broken up into salicylic acid and acetoparamido-phenol that the former acts *in statu nascendi* for a considerable period of time, but does not give rise to untoward action. It is an excellent antirheumatic, acting in acute and subacute articular rheumatism equally as well as do salicylic acid and sodium salicylate, but without their unpleasant after-effects. In chronic articular rheumatism it is no more useful than the above-mentioned drugs. It is an excellent neuralgic and analgesic in cephalalgia, migraine, odontalgia; facial, trifacial, and intercostal neuralgia; and in the nervous form of influenza. It produces good results in chorea. It acts well in various skin affections which are accompanied with itching: prurigo, urticaria, pruritus of diabetes, eczema, and psoriasis. Drews (Ther. Monats., H. 3, '98).

SANDAL-WOOD AND OIL OF SANDAL-WOOD.

—Sandal-wood (red sanders; *Santalum rubrum*, U. S. P.) is the wood of *Pterocarpus santalinus* (nat. ord., *Leguminosae*). It occurs in the form of raspings. It contains a red coloring matter of a resinous character, known as santalic acid, or santalin, which occurs as a red, crystalline powder: soluble in alcohol, ether, and in acetic acid, but insoluble in water. It is not employed for any individual virtue, but is used in

pharmacy for imparting a red color to alcoholic solutions and tinctures. It is the coloring principle of the compound spirit (or tincture) of lavender.

Oil of sandal-wood (oil of santal; oleum santali, U. S. P.) is a volatile oil distilled from the wood of *Santalum album* (nat. ord., *Santalaceæ*), indigenous to India. The oil has a yellowish, or pale-straw, color; a spicy taste; and an aromatic odor.

Physiological Action and Dose.—It is a stimulant in small doses, and an irritant in large doses, to the various mucous membranes. It checks the secretions of the mucous membranes and causes dryness of the throat and thirst. S. Rosenberg has noticed, after doses of 60 drops a day, irritation of the alimentary canal, burning in the urethra during micturition, and an eruption of small red prominences upon the entire surface of the body, involving even the conjunctivæ.

Its general action upon the system is unknown. It seems to be more stimulating than oil of eucalyptus, and rather less so than terebene. When taken internally, it is eliminated by the urinary and respiratory mucous membranes; the odor is sometimes perceptible in the perspiration. Unlike copaiba, it causes no cutaneous eruptions, and is less likely to produce gastric or intestinal disturbance. Absorption and elimination are very rapid; it may be detected, by its odor, in the urine half an hour after its ingestion. It may be given in doses of from 5 to 30 minims, in capsules or dissolved in alcohol and flavored with cinnamon, in emulsion, or on sugar.

Therapeutics.—Oil of sandal-wood is an efficient remedy in asthma, chronic bronchitis, in the advanced stages of acute bronchitis, and in the advanced stages of gonorrhœa. It is also used as an ingredient of perfumes.

SCABIES.

Definition.—An inflammatory contagious disease of the skin, due to the presence of the *Acarus scabiei* and attended by severe pruritus.

Symptoms.—The eruption produced by the *Acarus scabiei* consists of scattered vesicles and papules, which are usually located between the fingers and on the flexor side of the wrists and elbows. The axillæ, mons veneris, abdomen and buttocks, the penis, the mammæ, and in children the legs and feet are the points of predilection next in order. The burrows of the parasite resemble scratches, which, upon close examination, may be seen to be beaded. The *Acarus* may readily be extracted from its burrow with the tip of a needle for microscopical examination. The eruption is attended with severe itching, which is especially marked at night. The scratching to which the patient subjects the parts greatly increases the local irritation. The eruption may become pustular or complicated by other dermatoses (eczema, urticaria, etc.), and present various characteristics due to the accumulation of epidermic *detritus*, dead *acari*, etc., or accumulated crusts. The hairs of the limbs affected are often shed, and the nails may become hypertrophied. The incubation-period extends from two days to a week. Occasionally the itching is absent: apruriginous scabies. During a general illness scabies is apt to disappear or improve; but the disease reappears as soon as convalescence is established.

Acarus does not inhabit the prickly layer, but the undermost part of the middle layer of the epidermis. The eczema of scabies is not caused by scratching, but by irritating substances given off by the *Acarus*. Török (Monats. f. Prakt. Derm., vol. viii. No. 8, '89).

Etiology.—The *Acarus scabiei* is about

one-quarter millimetre long, and resembles an eight-footed turtle in general outline; the males live under the skin or epidermic scales, the females under the epidermis in the burrows, where they deposit their eggs. The disease is very contagious, through contact with affected individuals and any wearing apparel or bedclothing that they may have used.

Treatment. — Scabies may be rapidly cured by adopting Hardy's method: scrubbing with soap and water, using a brush, twenty minutes; the same procedure, thirty minutes, but with the part immersed in the soap-water; rubbing of the part with the Helmerich-Hardy ointment:—

℞ Carbon. of potass., 25 grains.
Sulphur, 50 grains.
Lard, 5 drachms.—M.

This is left on two hours and the parts are bathed as before, but not brushed. Pruritus may usually be relieved by means of a 2-per-cent. menthol ointment. Vaseline or cosmolin is sometimes sufficient.

The simple sulphur ointment thoroughly, though gently, applied at night before retiring, followed the next morning by a warm bath, is often sufficient to cure scabies when persisted in two or three weeks, but the underwear should be very frequently changed. In many cases the ordinary sulphur ointment is too strong; it is always best to reduce its strength by mixing it with an equal quantity of benzoated lard. Sulphur-baths are also valuable, but ointments can be kept in contact longer with diseased parts, and are therefore more destructive to the parasite.

Large number of cases treated by painting the entire body with the balsam of Peru, which exercises a toxic action on the *Acarus*. No soap and water should be used before its applica-

tion. With a brush a thin layer of the balsam is laid on at night, followed by gentle rubbing. A bath is taken on the following morning. The remedy causes no irritation and is always well borne. Julien (Province Méd., Nov. 21, '96).

Literature of '97-'98-'99.

Tincture of benzoin used with excellent effect in two cases. The itching ceased after the first application of the tincture, and the eruption began to decline. Effects ascribed partly to the alcohol and partly to the benzoin. V. Holstein (Rev. Gén. de Pharm. et d'Hyg. Prat., vol. i, p. 5, '98).

Endermol (nicotine salicylate) used in 63 cases of scabies, six applications of a 1-per-cent. ointment being used. In stronger proportions toxic effects are produced. It is free from odor and does not stain linen. It proved curative in all cases. Wolters (Ther. Monats., Aug., '98).

Irritant ointments of various kinds condemned. A better, cleaner, and easier method is to take a thorough bath, after which sandsoap is used upon the tougher portions of the integument. A half-teaspoonful of powdered washed sulphur is then rubbed over the entire skin-surface. The same quantity should be placed between the bed-sheets and shaken so as to insure even distribution. This treatment repeated several nights cures in a week without causing a dermatitis. This treatment is also prophylactic whenever an individual is exposed to scabies. S. Sherwell (Phila. Med. Jour., June 24, '99).

Thirty-two cases of scabies have been successfully treated with nicotine soap. It is of a dark-brown color, and may be scented with oil of bergamot. It consists of tobacco extract, 5 per cent.; precipitated sulphur, 5 per cent.; and overfatty soap, 90 per cent. The patient is washed with warm water night and morning, and is then anointed from head to foot with this soap, which is allowed to dry on. This process is repeated for three or four successive days, when the cure is complete, and then he is given a hot plunge-bath. This ointment is free from unpleasant odor, and does not dis-

color the bed- or body- linen of the patient. Marcuse (Ther. Monats., Dec., '99).

SCALP AND SKULL SURGERY OF.

See WOUNDS AND INJURIES OF THE HEAD.

SCARLET FEVER.—Scarlatina. (Lat., *scarlatinus*; *febris* understood.)

Definition.—Scarlet fever is an acute, infectious, contagious, eruptive, disease presenting, in typical cases, the following features: After a period of incubation of from two to four days there is a sudden onset of sore throat, vomiting, and fever; within twenty-four hours a characteristic eruption appears and continues for about six days, when it terminates in desquamation.

Symptoms.—From the attack so mild that diagnosis is difficult to the fiercely-malignant form we see every possible degree of severity. Notwithstanding this variability of type, the majority of cases pursue a fairly-uniform course, and may, with propriety, be called ordinary cases. Other types may be described as mild, severe, and malignant.

ORDINARY TYPE.—The invasion is usually sudden, and is marked by vomiting, fever, sore throat, and rapid pulse. Occasionally a short period of malaise precedes the onset of definite symptoms. In older children a chill is sometimes the first symptom; in younger children a convulsion. The vomiting is usually repeated several times, and is not accompanied by nausea. When it occurs late in the disease it is a far more unfavorable symptom than at the outset. The intensity of the period of invasion is usually indicative of the severity of the attack, though this is a rule subject to many exceptions.

Literature of '97-'98-'99.

A clinical phenomenon in scarlatina in the most characteristic instances con-

sists in a paresis of the extremities, the patient complaining that he cannot move the hands or feet. This degree of disturbance, however, is very exceptional. Most frequently there is only a numbness of the hands, with sensations of tingling or formication. Numbness may be absent, and then the patient experiences pricking sensations localized in the extremities of the fingers or in the palm of the hands. Disturbances in the feet are of rarer occurrence; they may be noticed alone or in conjunction with those described in the hands.

This sign appears during the period of eruption, exceptionally before it. Its duration is very variable; it may be experienced for only a few minutes, and not be felt again. In the majority of cases it is more durable, appearing several hours or a day after the beginning of the eruption and persisting for two or three days, ordinarily with interruptions. It may even be delayed in its appearance until the third, fourth, or fifth day of the eruption. It is accompanied by no painful sensation. Some patients experience this disturbance only when they wish to use the hands; others at the moment of leaving the cold bath or when the hands are dipped into water.

This sign is very constant.

This sign in other eruptive diseases has not been encountered. Meyer (Presse Méd., p. 119, '98).

The temperature is frequently found to be 103° F. at the first visit and may reach 104° or 105° on the first day. A temperature on the first day above 104 1/2° indicates a severe attack; below 102° a mild attack. The highest point is commonly reached at the height of the eruption. It then begins to subside and becomes normal at a varying period, ranging from the ninth to the fifteenth day. The fever is frequently remittent and in mild cases almost intermittent in character. There is no typical temperature-range. The febrile stage, even in quite severe cases, may be limited to six or seven days, or it may be prolonged to

fourteen or fifteen days without obvious cause.

A pulse abnormally rapid as compared with the height of the temperature is quite characteristic of scarlet fever. It is often 150 on the first day, and continues rapid through the disease.

One of the earliest symptoms is sore throat. The fauces, tonsils, and pharynx are of a uniform bright-red color, and on the hard palate numerous dark-red macules may be seen. In mild cases the throat symptoms may be very slight; in more severe cases the tonsils may be studded with follicular spots or smeared over with a tenacious exudate closely resembling a pseudomembrane. There is frequently a discharge from the nose, which may consist of clear, tenacious mucus or muco-pus. The glands at the angle of the jaw frequently become enlarged.

Literature of '97-'98-'99.

In scarlet fever there is a general intense redness of the whole throat, including the hard palate. The entire mucous membrane is affected, and the small dots, which in connection with the hyperæmic condition of the skin represent the condition of a punctate erythema, from being localized on the moistened mucous membrane, have a little darker appearance than the adjacent reddened tissue. In measles, on the contrary, the mucous membrane of the throat has a blotchy appearance, and is of a darker red than is seen in scarlet fever, while the mucous membrane between these blotches is but slightly congested in comparison with that of scarlet fever. T. Rotch (Boston Med. and Surg. Jour., May 27, '97).

As the disease progresses, the tongue, which is at first coated, often assumes the so-called strawberry appearance. Much confusion exists as to what the strawberry tongue really is. It is not a white tongue with red papillæ; such a tongue is seen in various conditions. The true straw-

berry tongue was originally described by Flint as follows: "The tongue in the first days is usually coated. In the progress of the disease the tongue usually exfoliates, leaving the surface clean and reddened and the papillæ enlarged. The appearance is strikingly like that of a ripe strawberry. The strawberry-like tongue is a pathognomonic symptom; it is peculiar to this disease. It is often, but not uniformly, present." The term should be applied to the red, clean tongue with prominent papillæ which follows a coated tongue.

Literature of '97-'98-'99.

All agree that during the first three or four days of scarlet fever the tongue is white-coated, with the papillæ prominent, sticking out through the white fur, as if the tongue had been sprinkled with red pepper. After the fourth day this coating disappears, sometimes gradually, sometimes quickly, leaving the tongue of a bright, shiny red, and very prominent papillæ.

The first conditions, while common in scarlet fever, and while the redness of the papillæ is more marked in that disease than in any other, do not occur in many febrile affections, especially where there is irritation of the digestive tract. Therefore, it cannot be in itself characteristic of scarlet fever. The more or less sudden desquamation of the tongue, leaving it bright red and rough, with prominent papillæ, does not occur in any other disease, and is therefore characteristic of scarlet fever. If the term strawberry is to be applied at all, it should be to the rough, bright-red tongue with prominent papillæ. M. H. Fussell (Univ. Med. Mag., May, '97).

The eruption usually appears within twenty-four hours after the initial vomiting. It is not infrequently seen after twelve hours, and is sometimes delayed for thirty-six hours and in rare cases to the fourth or fifth day. There is frequently intense itching or burning of the

skin. The rash is usually well developed during the second day of its appearance. It then continues from four to six days, when it gradually subsides. It usually appears first over the front of the neck and upper part of the chest. It consists of minute points of bright-scarlet color closely grouped together on a slightly-reddened skin. They become confluent in places, forming bright-scarlet patches, but over the most of the surface they remain discrete throughout. Being hyperæmic in nature, the rash disappears on pressure, leaving, for a perceptible time, a white spot. An eruption of very fine vesicles is seen in rare instances, and occasionally a blotchy eruption appears early on the face, but subsides as the typical rash develops.

One of the most characteristic symptoms of scarlet fever is the desquamation. It rarely begins before the sixth day, and is frequently delayed until the second week. It appears first on the neck and between the fingers. It begins as fine, branny scales, but soon changes to large lamellar scales. Sometimes the skin can be peeled off in strips. It continues from ten to thirty days, and is most persistent where the skin is thickest. It frequently continues about the fingers and nails after other portions of the body are clear, which explains the readiness with which the disease is conveyed by letters. When the skin has received careful attention, the desquamation is sometimes almost imperceptible. In rare instances a second desquamation occurs.

The urine becomes scanty and high colored during the febrile stage, and frequently contains a slight amount of albumin and sometimes blood and hyaline casts. Except in the more severe forms, suppression is rare and dropsy still more so. These symptoms usually subside as the fever falls. The kidney symptoms at

this stage rarely prove serious. They may, however, do so, and always demand attention. The more serious kidney symptoms occur later and will be considered as a complication.

Literature of '97-'98-'99.

The following is the result of personal observations made as to the occurrence of peptonuria in scarlet fever. 1. The urine in scarlet fever very frequently contains peptones; they are usually present in a moderate degree, and are rarely abundant. 2. Peptonuria is not necessarily associated with albuminuria; both may be present at the same time, but the conditions are independent. 3. In cases complicated with pneumonia peptones were seldom found in the urine, and, if present, their appearance was noted on the third day of illness, and they entirely disappeared as soon as the crisis ensued. 4. The severity of the disease has no bearing whatever upon the occurrence of peptonuria. Hence the prognostic value of peptonuria is doubtful. 5. In all the cases there was constantly present inflammation of the inner ear and the lymphatic glands, with tendency to pus-formation. 6. Ervant's test (potassic mercuric iodide) often failed to produce the characteristic precipitation where peptones were proved to be present in the urine by other tests; on the other hand, it formed a precipitate when peptones could not be detected. 7. Schultze's statement that the production of peptonuria is greatly influenced by high temperature is discredited. No such relation between high temperature and peptonuria could be made out. M. Hemser (Vratch, No. 1, '99).

MILD TYPE.—Scarlet fever is sometimes so mild as to render diagnosis very difficult. The symptoms may be so slight that medical aid is not sought. As a rule, however, there is an onset of vomiting, fever, and sore throat, as in the ordinary type, but none of the symptoms are urgent. The vomiting is not persistent, the temperature does not rise

above 102° or 103° F., and the throat presents only the symptoms of mild pharyngitis. I have seen an undoubted case in which the temperature never rose to 101°. It may become normal on the fourth or sixth day. The eruption is often very faint, and may not appear on the face. It may, however, be bright and distinctive for twenty-four hours and then fade away so rapidly as to have disappeared by the fifth day. In rare instances it is an evanescent rash which disappears entirely within twenty-four hours. Nephritis may be a sequel, due in many cases to exposure and lack of care: the natural results of so mild an illness. Owing to this lack of care and isolation, the patient may become very dangerous to others. It is by these mild cases that the disease is sometimes sown broadcast. A mild attack in one child may produce a malignant one in another.

Literature of '97-'98-'99.

Twenty-three statistical cases reported in which the eruption was exclusively limited to the face. The patients suffered from an angina, with fever and redness of the face. The fever fell, but the redness continued, and was shortly followed by a more or less abundant desquamation. A few of the cases afterward developed albuminuria, anasarca, and symptoms of uræmia. Lemoine (Soc. Méd. des Hôp., Jan. 29, '97).

The appearance of a punctate eruption in the armpits and in the groins, together with the congestion of the tonsils and a punctate eruption in the roof of the mouth, no matter whether there is any eruption elsewhere or not, are positive proofs of scarlet fever. The most characteristic feature of the disease is, the enlargement of the papillas of the tongue. It appeared as the one constant symptom in each of 1000 cases examined. It is often important to make a diagnosis of scarlet fever after the rash has subsided, in order to prevent infection during the period of desquamation. Here the existence of a white line at the junction of the

pulp of the finger with the nail is of great assistance. J. H. McCollom (Phila. Med. Jour., June 3, '99).

SEVERE TYPE.—Not only are the symptoms of this type severe, but the various stages are prolonged. The fever may continue for three weeks or more, and the stage of desquamation for even a longer time. A fatal termination is common, death occurring usually during the second week. The chief peculiarity which distinguishes this from the ordinary type is the presence of septic symptoms due to streptococcic infection. The type might, therefore, with propriety be called the *complicated type*. The throat is usually the first to show the evidence of streptococcic invasion. On the third day and in some cases on the first or second day a membranous exudate appears on the tonsils and soon invades the pharynx and naso-pharynx. A purulent nasal discharge appears, and the lymphatic glands at the angle of the jaw begin to swell, the cellular tissues being so involved as to often cause immense enlargement. The Eustachian tubes are involved, and purulent otitis media follows: but the larynx commonly escapes. The urine contains albumin and perhaps blood-cells and hyaline and epithelial casts. Symptoms of general septic infection rapidly supervene. There is low delirium or stupor; the child refuses nourishment and may die from exhaustion; but sudden death is not uncommon. Others, after overcoming one complication after another, slowly recover after a tedious convalescence.

MALIGNANT TYPE.—Though very rare, malignant scarlet fever does sometimes occur. It begins with convulsions and hyperpyrexia. The scarlatinal poisoning may be so intense as to cause death within twenty-four hours. More commonly, death does not occur before

the third or fourth day, the patient being comatose or delirious. The nervous symptoms are so marked that some writers have given to this type the name of cerebral scarlet fever. In a case of my own the initial symptoms were convulsions, hyperpyrexia, and hæmaturia.

Literature of '97-'98-'99.

True scarlatina maligna is now comparatively rare, and in consequence scarlet fever is no longer the dreaded and fatal disease it once used to be. Out of an experience of over 5000 cases, only 3 undoubted cases in children under four months of age seen. C. K. Millard (Brit. Med. Jour., Jan. 15, '98).

SURGICAL SCARLET FEVER.—Patients who have undergone surgical operations are unquestionably very susceptible to scarlet fever. Such scarlet fever, however, is not essentially different from the usual disease. It is simple scarlet fever in a surgical case. It is, no doubt, true, as Osler has shown, that the eruption which has frequently led to a diagnosis of scarlet fever is nothing more than the red rash of septicæmia. It is a fact that surgical scarlet fever is much less common since surgical septicæmia has become less frequent.

Literature of '97-'98-'99.

Case of scarlatina after laparotomy and in childbed shows that one may fearlessly perform an operation that does not admit of delay (*e.g.*, herniotomy) on a patient suffering from uncomplicated scarlet fever, and, further, that a woman so suffering may be confined, or a puerperal woman have scarlet fever, without the genitals' being infected. These statements refer to simple scarlatina, not to the traumatic form of the disease. Sipel (Centralb. f. Gyn., Nov. 5, '98).

Etiology.—Among the predisposing causes age must be placed first. The disease is rare under one year, but I have seen an undoubted attack of scarlet fever

in an infant of one week. Up to five years the susceptibility steadily increases and reaches its maximum; after eight years it rapidly decreases, and is slight during adult life. Sex does not influence its occurrence.

Literature of '97-'98-'99.

Case of scarlatina in a 2-day old babe. Eruption and sore throat were distinct and the child died on the third day. The mother had been attending four other children in her family ill with scarlet fever up to within a few hours of the labor. A. Cordes (Brit. Med. Jour., Dec. 3, '98).

That scarlet fever is an infectious disease does not admit of doubt, but the specific germ has not yet been discovered. It has, however, been fully demonstrated that streptococci play an important rôle in the causation of many of the symptoms. It has been urged by some that streptococci are the cause of the disease itself, but this ground is untenable. They are, however, the cause of the pseudomembranous exudations of the throat, and undoubtedly cause the otitis, and adenitis, and probably the nephritis, pneumonia, and joint lesions.

Whatever the cause of the primary disease may be proved to be, it is certain that streptococci are the direct cause of the secondary symptoms. They are so constant in their presence and so active in the production of the more serious symptoms and complications that they must be regarded as important factors in the production of the clinical picture which we know as scarlet fever. The disease as it commonly appears is a mixed infection, the more malignant and fatal symptoms being due not so much to the primary as the secondary infection. Staphylococci and diphtheria bacilli are sometimes found in conjunction with the streptococci.

Literature of '97-'98 '99.

Seven cultures of streptococcus obtained from cases of scarlet fever, 3 being taken from the throat, 2 from the urine, 1 from a suppurating lymph-gland, and 1 from the blood. All these were morphologically identical, and were large individuals forming long chains, frequently interlaced, and when inoculated caused local joint diseases, even when introduced beneath the skin. It is believed that in scarlet fever an ordinary streptococcal infection does not occur, and that the organism found in the throat, blood, pus, and urine of the patients differs from the streptococcus pyogenes. All 6 of these cultures were absolutely refractory to the serum of Marmorek, and, as the action of the serum is very different upon the organisms supplied by Marmorek, it is concluded that the distinction between the two forms is specific. This opinion was confirmed by the results of the experiments with the seventh culture: one obtained from the throat. In this the individuals were small and the chain short, with no apparent interlacing. It was found that the serum of Marmorek was capable of retarding death very considerably, even when three hundred times the lethal dose had been employed. Mery and Lorrain (*Comptes Rend. de la Soc. de Biol.*, Feb. 19, '97).

Twelve cases of scarlet fever studied bacteriologically. In eleven cases the results were entirely negative; in the twelfth streptococci were found which, however, probably had little to do with the trouble. Analysis of some eight hundred cases also presented. Atmospheric conditions and the season of the year seem to exert no influence upon the disease.

The causes of death in the greater number of cases occurred from sepsis, nephritis coming second. C. Seitz (*Münch. med. Woch.*, No. 3, '98).

Long series of investigations which support the opinion that the organism of scarlet fever is a streptococcus closely analogous to that of erysipelas. The streptococcus is found in the urine of scarlet-fever cases, but not in other urines, especially when albumin is pres-

ent. In 97 urines from scarlet-fever cases albumin was present in 42. Of these 42, streptococci were present in 30, while in non-albuminous urines streptococcus was present in 27 per cent. After death streptococcus may be found in the blood, especially that taken from the heart. While it seems to possess characters peculiar to itself, there is great difficulty in differentiating it from the streptococcus P. and the streptococcus of erysipelas. Courtois (*Thèse de Paris*, '99).

Diplococcus believed to be the cause of scarlet fever. Obtained mainly from the throat and scales of patients. Polymorphous in character, of unusual size. It is not capsulated. Grows often upon glycerin-agar, to which about 5 per cent. of black garden-earth has been added. Cultures obtained from the blood on the first day of the disease. Not found in the blood of any normal patient. The organism is not pathogenic for rabbits and guinea-pigs, unless their vitality has been very much reduced, when it produces an acute nephritis. Class (*Med. Rec.*, Sept. 2, '99).

Cultures made from throats in seventeen cases of scarlet fever in accordance with the directions given by Kline. In only one instance was a streptococcus, corresponding in structural characteristics to the streptococcus scarlatinae, isolated. Hence this organism is either not constantly present or is isolated with great difficulty. Billings (*N. Y. Med. Jour.*, June 3, '99).

Experiments seem to show that the specific germ of scarlet fever exists in the blood, for inoculation with the serum into susceptible animals produces a typical attack of the disease. It is, also, found in the various secretions, as shown by their power to generate the disease.

The micro-organism, while more tenacious of life than is that of most other diseases, either lacks the power of gaining a foothold, when implanted in the system, or is less readily conveyed through the air. It is at least a fact that many more children escape scarlet fever than

measles, and its spread is more readily controlled.

The chief source of infection is the patient himself, but the area of contagion is limited to a few feet. The desquamation-scales are extremely infectious. Their retention by clothing, bedding, and the walls of the rooms is one of the most common causes of infection. The purulent secretions from the throat, nose, and ear are also very infectious.

Literature of '97-'98-'99.

The infection of scarlet fever is probably confined to the period of scaling off. The scarlatinous virus surpasses any other eruptive fever except variola in its tenacity and portability. One of the most marked features of the disease is the predisposition which it entails to the incursion of pathogenic germs other than those we believe to cause the disease itself, thus causing croupous inflammations, etc., as complications.

The germ may be carried not only by fomites, but on the hands and in the hair. They live for years. N. D. Coxe (*Sanitarian*, Aug., '97).

Scarlet fever is the most irregular of all the exanthemata in its virulence and in the manifestations which it presents in different individuals. The skin appears to be the chief vehicle of the contagion, which has a wonderful tenacity for clothing and other articles, and may be capable of reproducing the disease for many months. In contradistinction to measles, which is known to be highly infectious in the early stage, scarlet fever appears to be most infectious in the later stages, and the contagium is most likely to be disseminated during the stage of desquamation. T. Rotch (*Boston Med. and Surg. Jour.*, May 27, '97).

Bacteriological study of desquamating skin of persons at various stages of convalescence made. At no stage of the peeling process after scarlatina has there been detected in the cuticle any microbe which could be regarded as concerned in spreading the disease. The

urine afforded a similar negative result. Klein (*Brit. Med. Jour.*, Jan. 1, '98).

Scarlet fever is spread by indirect infection more frequently than any other disease except diphtheria. Its specific micro-organism is more tenacious of life than that of any other disease, except, perhaps, small-pox. Authentic cases have been reported in which it maintained its vitality for a year or more. It may be conveyed from one child to another in the fur of cats and dogs, and it is probable that these animals may suffer from the disease. The contagion clings to rooms with great tenacity, being usually lodged in the wall-paper or in cracks of the walls, ceilings, and floors. The conveyance of scarlet fever by milk and other articles of food is undoubted.

The celebrated epidemics of Hendon and Wimbledon were believed by Dr. Klein to be due to scarlet fever in the cows, but this belief has not been substantiated. It is probable that the disease from which those cows suffered was not true scarlet fever. The disease has been conveyed by letters written by hands in the stage of desquamation. An attendant upon a case of scarlet fever may easily carry the infection to other children by the cloths, hands, or beard.

Literature of '97-'98-'99.

Case of scarlatina in a boy, aged 2½ years, living in a district which had been free from scarlet fever for years. Investigation showed the source of infection to be a letter, received six days before the boy sickened, from the grandparents, announcing that a child living with them was convalescent from scarlet fever, and "shedding her skin," a few pieces of which were inclosed. The letter and its contents were used as a plaything by the boy until the day he sickened. Laurie reports a German woman who wrote during convalescence from scarlet fever to two friends in France, both of whom sub-

sequently developed the disease and died. Grasset (*Ann. d'Hyg. Pub.*, vol. xxxiv, and *Central. f. Bakt.*, etc., Jan. 9, '97).

Report of a remarkable instance of the participation of swine in an outbreak of scarlatina in Germany. While the children at a number of farm-houses and cottages were suffering from scarlatina of a severe type, the pigs were attacked by a highly infectious and fatal fever, the symptoms and post-mortem appearances of which were identical with those of scarlatina in man, viz.: angina, erythema, followed, in those that recovered, by desquamation, œdema of the extremities, albuminuria, uræmia, and acute nephritis. A healthy animal at a house where none of the family had been attacked, having been inoculated with the blood of a child suffering from scarlet fever, died at the end of a week with symptoms and lesions indistinguishable from those of the human disease and from those of the pigs that had presumably contracted it from the inhabitants. Behle (*Brit. Med. Jour.*, Jan. 28, '99).

The portal of entrance in most cases is undoubtedly the naso-pharynx. It is here that the first local symptoms appear, and all the evidence points to the fact that both the primary and secondary micro-organisms commonly enter the system at this point.

In cities scarlet fever is endemic, a few cases appearing in the health reports every week, but at intervals it becomes epidemic, usually during the fall and winter. Epidemics of scarlet fever usually spread very slowly as compared with those of measles.

PERIOD OF INCUBATION.—The period of incubation is shorter than that of any other infectious disease, except, perhaps, grippe and diphtheria. The extremes range from a few hours to fifteen days. In 87 per cent. of cases Holt found the period to be less than six days and in 66 per cent. between two and three days.

PERIOD OF INFECTION.—The period of infection is long. The disease is not in-

fectious during the period of incubation, but it may be so from the first appearance of changes in the throat. The most actively-contagious period is at the height of the febrile stage: on the third, fourth, and fifth days. The infectious power then diminishes, but increases again during the stage of desquamation. The period of contagion continues until the last evidences of desquamation have disappeared. The purulent discharges from the throat, nose, and ears are capable of infecting others, and isolation should not be relaxed until they have disappeared. The conventional forty days is not too long. It should be as much longer as the condition of the skin and mucous membranes may indicate.

Literature of '97-'98-'99.

Four thousand nine hundred and ten cases of scarlet fever collected, of which 158, upon their return home, appeared to have carried infection and to have caused 171 new cases. The greater proportion of infection occurred during the first week, and diminished quite rapidly until the sixth. As these cases were isolated for an average period of 8.3 weeks from the initial symptom, it appears that this period is insufficient. Of these cases, those that were isolated for more than 9 weeks conveyed less than half as much infection as the others. The so-called return cases are usually of the severe type. The source of infection may be either the nasal discharge, the discharge from the ear, or the desquamated skin. C. K. Millard (*Brit. Med. Jour.*, Sept. 3, '98).

The causes producing "return" cases of scarlatina are thought to be the following: (1) imperfect disinfection of the clothing of the first patient; (2) the retention of the poison in the skin or throat, or most often in the discharges from the throat, nose, or ears; (3) infection contracted before leaving the hospital by patients admitted for other diseases. J. Wright Mason (*Public Health*, Apr., '98).

Pathology.—In uncomplicated scarlet fever the lesions are confined to the skin and throat. The lesions of the skin are those of acute dermatitis. The papillæ and the stratum beneath become infiltrated with fluid, while about the blood-vessels there are aggregations of leucocytes. The production of epithelium is greatly increased during the acute stages, which result later in profuse exfoliation of the superficial layers. In the later stages in addition to this, according to Neumann, there is also a profuse development of exudative cells, particularly among the ducts and follicles. These cells easily reach the epithelial surface: a fact which accounts for the great infectiousness of the desquamating cells.

The throat changes in uncomplicated scarlet fever are catarrhal in nature, and are an essential part of the disease. The croupous and diphtheritic membranes must be considered as complications.

COMPLICATIONS AND SEQUELÆ.—

Angina.—Except in a very few mild cases, the throat always shows some pathological change. A catarrhal condition of the throat is normal to scarlet fever, but membranous exudates and gangrene are not essential to it.

The true nature of the membranous inflammation seen in scarlet fever was long a subject of discussion, which has been settled by the bacteriologist. With few exceptions, the angina of the early stages is pseudodiphtheria, that of the late stages true diphtheria. While primary pseudodiphtheria is a mild disease, the death-rate being rarely over 5 per cent., secondary pseudodiphtheria is very dangerous and fatal. The membrane may appear on the throat on the first or second day, but it is not usually seen before the third day. It is generally confined to the tonsils, but frequently fills the throat and naso-pharynx. It shows a

tendency to invade the ears and nose and to shun the larynx. It reaches its height about the sixth or seventh day. It frequently presents all the local characteristics of diphtheria together with the general symptoms of septicæmia. The exciting cause of this membranous inflammation is the streptococcus pyogenes. It is occasionally associated with the staphylococcus aureus or albus, but the streptococcus is the more commonly observed. It occurs not only in the pseudomembrane and the tissues underneath it, but is found in the blood in large numbers. Through the agency of the toxins which it generates it is unquestionably the cause of the complications and general septicæmia. The pseudomembranes which appear late in the disease are usually associated with the Klebs-Loeffler bacillus. Diphtheria is, in the fullest sense of the word, a complication, and is not an essential symptom of scarlet fever.

Otitis, next to angina, is the most common complication, and in its results is one of the most serious, as it is a common cause of deaf-mutism. It results from extension of the inflammation from the throat through the Eustachian tubes. The tendency to ear involvement varies in different epidemics, but it is more common in young patients. It does not usually occur until the second week, and, as a rule, involves both ears. Its presence may be indicated by earache and an increase in the fever, but frequently a discharge is the first indication that the ears are involved. The process is prone to be a destructive one and to result in long-continued suppuration. It sometimes leads to a rapidly-fatal meningitis.

Adenitis and cellulitis are common results of streptococcic invasion of the throat. Not only are the lymphatic

glands themselves enlarged, but there is more or less inflammatory œdema of the surrounding tissues. That this is due to secondary infection is shown by the fact that streptococci are found in abundance in both the nodes and œdematous tissues around them. Enlargement of the nodes may be detected during the first week, but serious cellulitis does not, as a rule, occur until later in the disease. Suppuration, sloughing, or even gangrene may occur.

Joint Lesions.—Although acute articular rheumatism sometimes occurs, the joint affection often called scarlatinal rheumatism is, in most instances, a synovitis. It is mild, and is frequently confined to the wrist. It appears early in the second week, continues for three or four days, and disappears, suppuration being rare. It is seldom seen under four years. Pyæmic arthritis occurs in extremely rare instances, and affects the larger joints, the lesions being multiple. Marsden has recently offered the following excellent classification of the scarlatinal joint lesion: (a) synovitis, (b) acute or chronic pyæmia, (c) acute or subacute rheumatism, and (d) serofulous disease of the joints.

Nephritis.—Albumin may be found in the urine during the acute stage; but it is febrile albuminuria, due to degenerative nephritis, which subsides as the temperature falls. In the grave type kidney lesions may occur, to which the term septic nephritis has been given. The urine contains albumin, but blood and casts are not necessarily present, neither do the rational symptoms of uræmia appear.

The most characteristic and common kidney lesion is post-scarlatinal nephritis, and is a diffuse nephritis. It develops during the third or fourth week, and may follow a severe or mild attack. There

may be no interval of apyrexia between the kidney attack and the onset of the nephritis. It may be so mild as to almost escape notice, or it may be so severe as to cause speedy death. Recovery may be complete or incomplete. The first symptom to be noticed is usually œdema of the face, which is frequently accompanied by feverishness and restlessness. Dropsy and all the characteristic symptoms of acute nephritis rapidly develop. The urine usually shows a small amount of albumin for a few days before the advent of definite symptoms. As the disease develops, the urine becomes scanty and high colored, and may be completely suppressed. It contains a large amount of albumin, and is loaded with blood-cells and casts. The first evidence of albumin after the second week should be a warning of danger, and should receive immediate attention.

Pneumonia, although commonly found at the autopsy in patients who have died with septic symptoms, is frequently not recognized before death. Endocarditis and pericarditis, though uncommon, are sometimes encountered. Murmurs are occasionally heard during the course of the disease, which disappear as the active symptoms subside. Permanent organic lesions sometimes develop in conjunction with the late kidney complications. Nervous symptoms are rare. The various serous membranes are occasionally involved. Peculiar attacks of symmetrical, superficial gangrene have been reported. The disease may be complicated by any of the other infectious diseases.

Second attacks of scarlet fever are extremely rare. They sometimes occur, but in most supposed cases there has been some error in diagnosis. Relapses are more common than second attacks. They result from autoinfection, and usually occur during the second or third weeks.

Prognosis.—The younger the patient, the greater the mortality. Holt, after the study of a large number of American and European cases, concludes that the general mortality may be assumed to be from 12 to 14 per cent., while under five years it is from 20 to 30 per cent. It is much lower in private practice than in hospitals. The majority of fatal cases occurs in children under seven years. Prognosis is rendered unfavorable by the appearance of the following symptoms, the gravity being in proportion to their severity: Violent onset, high temperatures, convulsions, extensive pseudomembranes or gangrenous pharyngitis, diphtheria, croup, pneumonia, excessive cellulitis, superficial gangrene, nephritis, and exhaustion with general septic symptoms. The prognosis in uncomplicated cases, even when the disease runs an active course, is good.

Literature of '97-'98-'99.

Study of 1000 cases. The percentage of mortality, including moribund cases, was 9.8. Scarlet fever uncomplicated caused 56 deaths; broncho-pneumonia, 15; diphtheria and scarlet fever combined, 10; diphtheria alone, 9; pneumonia, 4; scarlet fever and erysipelas, 1; tubercular meningitis, 1; and 2 died from various complications. J. H. McCollom (Phila. Med. Jour., June 3, '99).

Prophylaxis.—In view of the gravity of the disease and the effectiveness of preventive measures, prophylaxis assumes unusual importance. The most important of all prophylactic measures is complete isolation of the sick. This applies to nurse as well as to patient. If possible, one person should be selected as an intermediary between the nurse and the family. The doctor should always wear in the sick-room a gown of muslin or calico fastened at the neck and wrists and long enough to completely cover his clothes. A stethoscope should be used

in making physical examinations of the chest.

The period of isolation should not be less than forty days and as much longer as the presence of desquamation or purulent discharges may demand. Discharges of the patient should be disinfected with strong sublimate solutions. The bedding, carpet, and clothing should be disinfected with boiling water or steam. The mattress should be destroyed. The room itself should be thoroughly washed—floor, ceiling, and walls—with a 1 to 2000 sublimate solution.

One room on the top floor of every house should be arranged for a sick-room: the moldings should be plain and the floor of hard wood; the walls and ceilings should be painted or covered with washable paper; the bedstead should be of enameled iron. It is a fallacy to suppose that dishes in the sick-room, filled with antiseptic fluids, can limit the spread of the disease, or that there is any efficiency as a prophylactic in generating steam impregnated with medicinal agents. Their use is liable to generate a false sense of security and lead to the neglect of more important measures.

Literature of '97-'98-'99.

The most reliable prophylaxis of scarlet fever is isolation of patients and nurses and thorough use of disinfectants in their rooms and on their persons. All articles not absolutely needed should be removed from the sick-room, and no one except nurses and physicians allowed to enter. Constant ventilation should be insisted upon. Clothing used about the patient should, on removal from the sick-room, be placed in a tub of boiling water containing carbolic acid and sulphate of zinc, or in corrosive-sublimate solution 1 to 1000, and allowed to soak at least an hour; then placed in boiling water for washing. Vessels used by the patient should have a disinfecting fluid constantly in them, and be cleansed with boiling water immediately after using.

Water-closets should be disinfected daily with lime or sulphate of zinc. Sterilized cloths should be used in place of handkerchiefs, and burned after using. During desquamation the patient should be kept well anointed with carbolized vaselin or lysol and vaselin. The physician also should anoint his hands and face and put on a close-fitting gown and hood before entering the room, and should wash and disinfect his hands and face and put the gown and cap in a bag containing a sponge saturated with formaldehyde before leaving the house.

After convalescence, the room and everything which has been exposed should be thoroughly disinfected, and feather or straw beds, or other things which cannot be thoroughly disinfected, should be burned. Formaldehyde is probably the best, safest, and cheapest disinfectant in use. N. D. Coxé (*Sanitarian*, Aug., '97).

Treatment.—Many specifics for scarlet fever have been proposed, tried, and found wanting. Much may be done to avert complications and to render them less serious when they occur, and many lives may be saved by judicious management. Mild cases require little or no medication; they usually receive too much.

The patient should be kept in bed for at least three weeks, and should receive a fluid diet for not less than two weeks. Milk is the best diet for scarlet-fever patients. It may be given peptonized or plain. Later in the disease broth, eggs, or meat-jellies may be given. The stomach should never be overfilled.

The initial vomiting usually requires no treatment, but the bowels should be acted upon mildly by small, repeated doses of calomel. Later they should be kept acting, if possible, by means of enemata rather than by the use of cathartic drugs.

Literature of '97-'98-'99.

For fetid diarrhoea in the initial stage of scarlatina:—

R Sulphate of magnesia, 30 grains.

Dilute sulphuric acid, 30 minims.

Simple syrup, 4 drachms.

Distilled water, 3 ounces.

M. Sig.: A teaspoonful to a tablespoonful every hour according to age. Editorial (*Med. News*, Jan. 15, '98).

In severe cases stimulants are required. In malignant cases they should be pushed to the point of tolerance. Strychnine is of great value in septic cases with prostration; it may often be combined to advantage with digitalis. Bathing the surface with warm water followed by anointing with plain or carbolized vaselin or a 5-per-cent. ichthyol ointment should be begun as soon as the first signs of desquamation appear and should be continued throughout the course of the disease.

The throat symptoms of the first few days may be mitigated by giving cool water or bits of ice. Later hot drinks may be given or irrigation of the back of the throat with a weak hot saline or boric-acid solution may be employed. Chlorate of potash should be avoided. Its beneficial effects are doubtful and its known irritating effect upon the kidneys contra-indicate its use. Nasal syringing should be avoided unless clearly indicated by a purulent nasal discharge or obstruction of the naso-pharynx. More harm than good may result from overzealous attempts at local treatment of the throat and nose. The most successful treatment consists in the use, not of active and poisonous antiseptics, but of mild and cleansing washes, freely and frequently applied.

Adenitis can only be controlled by checking the septic process at its fountain-head in the throat. The application of hot oil or the hot-water bag is soothing to some patients, but the use of cold is preferable in most cases. Poultices should not be applied continuously. Dif-

fuse suppuration requires free incision. Otitis requires the treatment demanded by the disease in other conditions. The joint affections require but little treatment other than rest and protection. Rheumatism should receive its own appropriate treatment. Restlessness and nervous symptoms are sometimes relieved by cold to the head or by the use of small doses of phenacetin, not enough being given to materially affect the temperature. Nephritis should receive prompt and very careful attention. Its treatment is that of nephritis due to other causes.

Literature of '97-'98-'99.

Only those diuretics should be used in nephritis of scarlet fever which do not irritate the kidney. Acetate of potassium is one of the safer diuretics in this complication. In severe cases, with general œdema and threatening uræmia, cathartics are rather more certain in their action than diaphoretics and diuretics, and are especially indicated where, as is usually the case, constipation is present. Podophyllin in doses of $\frac{1}{10}$ grain may be given to a child five years old, and be repeated a number of times. It usually acts quickly. The compound jalap powder, in doses of from 5 to 10 grains, may also be given where a rapid and decided derivation by the intestine is indicated.

If the skin is hot and dry and uræmic symptoms (usually represented by anuria, somnolence, amblyopia, and headache) are present, we may resort to the hot pack, either wet or dry. The child should be wrapped in a blanket and placed directly in a tub containing water at a temperature of from 105° to 110° F. The child should be kept in the water fifteen or twenty minutes, or even longer if necessary, and should then be taken from the wet blanket, enveloped in hot, dry blankets, and kept in them until the skin has become moist and reaction has taken place. While the child is in the bath milk may be given to it, and stimulants if they are indicated by a weak or an intermittent pulse.

In addition to this treatment, hydro-

chloride of pilocarpine, in doses of $\frac{1}{20}$ grain, should be given by the mouth to a child of two years, and subcutaneously if desired to a child five years of age. In these cases of threatened uræmia convulsions sometimes appear quite suddenly. Under these circumstances enemata of hydrate of chloral, from 5 to 10 grains dissolved in water, are of value in controlling the nervous phenomena. The author prefers, however, to use a combination of bromide of potassium and hydrate of chloral.

Where the ascites is extreme, paracentesis abdominis is often of great value, not only in relieving the pressure, but also in increasing the action of the diuretic, which perhaps before was not acting freely. Digitalis is a valuable remedy, especially adapted to the treatment of the nephritis of scarlet fever and to that of the cardiac changes which result from it. By the administration of this drug the flow of urine is increased. It is best given in the form of a freshly-prepared infusion, in teaspoonful doses every four hours, to a child five years old. Diuretin, .5 grains dissolved in water and given two or three times in the twenty-four hours, has proved of considerable value. Nitroglycerin is valuable where the action of the heart suddenly becomes feeble and irregular. T. Rotch (Boston Med. and Surg. Jour., May 27, '97).

An eliminative treatment favored. The patient should be urged to drink water freely, and potassium acetate should also be given. Ewing (Phila. Med. Jour., July 1, '99).

Use of lithia-water advocated, and the flushing out of the bowel with water in order to stimulate the renal function. Quayle (Phila. Med. Jour., July 1, '99).

Acetanilid is useful for relieving the severe headache and the joint pains, but phenacetin is better when much muscular pain is present. If the pulse denotes high arterial tension, antipyrine should be prescribed; no harmful effects from it have been noted, even in the youngest infants, if given in doses of $\frac{1}{4}$ grain. To relieve internal congestion, particularly of the kidneys, a decoction of scoparis, and also such cholagogues as cas-

cara and sodium phosphate, are of value. Solomon (Phila. Med. Jour., July 1, '99).

The temperature may require attention from the outset, but it should not be forgotten that a high temperature is normal to scarlet fever. It may be allowed to run, therefore, without interference, to a somewhat higher point than in most other diseases. Hyperpyrexia, or a temperature continuously above 104° , demands treatment. It is best reduced by means of the cold bath; but this, for obvious reasons, is less practical in private than in hospital practice. The cold pack or cold sponging are more available. An effective method of applying cold adopted at the Willard Parker Hospital is thus described by Northrup: "The tendency in all cooling processes is for the feet to become cold. To obviate this the patient is placed upon blankets, but the legs, feet, arms, and hands are wrapped in warm, dry blankets, and hot bottles are inclosed in the wrappings. An ice-bag is applied to the head. The face and trunk are freely sponged in warm water and alcohol, evaporation being hastened by fanning, so long as it cools the patient, clears the cerebrum, gives force and improved rhythm to the heart, and leaves the patient to a quiet sleep." Great caution should be exercised in the use of antipyretic drugs. The coal-tar antipyretics are capable of doing much harm if injudiciously administered.

Literature of '97-'98-'99.

Cold baths valued in scarlet fever. The baths should be given from the time of invasion to the end of the disease. As soon as the temperature reaches $102\frac{1}{2}^{\circ}$, a bath, the temperature of which is 80° or lower, which lasts for about five minutes, is given. Children advanced in years may have even colder baths with advantage. The baths may be repeated every four or five hours. Where the physician fears that the shock to the

patient will be disadvantageous, warm baths may be used, the temperature being as high as 100° to 106° ; and, at the same time that active frictions are applied, cold affusions should be made to the head and shoulders. The following are contra-indications to the baths in this disease: Feebleness of the heart or existence of appreciable myocarditis, difficult respiration due to stenosis of the air-passages, epistaxis or hæmophilia, and inflammations of the joints. Where scarlatinal nephritis is to be treated, hot baths at about 100° to 102° or hot packs may be used to advantage to relieve the kidneys. Jurgensen (Blät. f. klin. Hydrother.; Revue de Thér. Méd.-chir., Feb. 1, '98).

Cold water should be the chief therapeutic agent in scarlatina—cold drinks, cold enemas, and cold packs. Antipyretic drugs, quinine, and iron should be avoided. Slagle (Phila. Med. Jour., July 1, '99).

Acetanilid used very freely during eight years, being main reliance in treatment of scarlet fever. The only unpleasant effect ever noted from its use was a diminution of the renal secretion, which was completely obviated by combining the acetanilid with soda bicarbonate. Garrison (Phila. Med. Jour., July 1, '99).

Coal-tar products should not be used in reducing temperature in scarlatina. Digitalis seems better than strophanthus in heart-complication, and copious draughts of water are best for flushing out the kidneys. Hot packs are better than pilocarpine in suppression of urine. Paracentesis of the membrana tympani should not be delayed if there is any bulging. The period for isolation of scarlet fever, in order to be effectual, should be continued for at least fifty days. J. H. McCollom (Phila. Med. Jour., June 3, '99).

When there is high temperature in the early part of the disease and severe nervous symptoms, an excellent method consists in putting the child in water at 90° F., sufficient to cover the body and extremities. A large wash-boiler or tub will generally suffice and has generally been used in personal cases. The child should be constantly rubbed while in the

water. The patient is to remain in the bath about eight minutes, dried quickly, and put to bed without taking time to put on a night-gown or other clothing. D. S. Hanson (Columbus Med. Jour., Aug. 5, '99).

Antistreptococcic serum has recently been proposed as rational treatment for scarlet fever, and some very favorable results have been reported from its use. At the present writing, however, very little is actually known of the treatment, and no expression of opinion is possible. As the more serious symptoms are due to streptococcic infection, the theory underlying this treatment is not irrational.

Literature of '97-'98-'99.

Experiments performed with the blood of persons convalescent from scarlatina. Blood drawn from a vein of the elbow, the serum was mixed with an equal amount of physiological solution of salt. 1 per cent. of chloroform was added, and the mixture passed twice through a Beckfeld filter. The serum was used in 13 cases of scarlet fever. It mitigated and shortened them all. Huber and Blumenthal (Berl. klin. Woch., No. 36, '97).

Severe case of scarlet fever in a 2-year-old child in which after the injection of 10 cubic centimetres of antistreptococcic serum the temperature fell within six hours from 106.5° to 100° F., and with general improvement. The temperature again rose and favorable results followed the use of the serum twice. Landis (Jour. Amer. Med. Assoc., Apr. 8, '99).

As emaciation and anæmia are frequent results of scarlet fever, active tonic treatment should be instituted during the convalescence, the chief reliance being placed upon iron. Basham's mixture is especially indicated. The patient should be particularly protected from cold, for exposure not infrequently seems to precipitate nephritis long after its usual period of occurrence.

FLOYD M. CRANDALL,
New York.

SCLERODERMA.

Definition.—A disease characterized by induration of the skin, and at times of the subcutaneous tissues, which sometimes progresses to complete atrophy of these tissues.

Varieties.—Three main varieties of scleroderma are recognized: the *diffuse*, which is generalized or limited to certain areas; the *circumscribed*, or morphea, which appears in spots; and *sclerodactyly*, which is limited to the hands.

Symptoms.—In the diffuse form, after a series of prodromic symptoms, sensations of chilliness or heat, pruritus, and pain in the muscles and articulations, the tissues become thickened, stiff, and hard, and appear œdematous. The skin is cold and whitish, contracted, and sometimes painful. The face and the upper part of the body may be the only parts affected, but the entire body becomes involved. The skin is, as it were, glued to the skeleton, the fingers and toes being thin and stiff or hooked. Gangrene is sometimes observed, constituting the mutilating form. The prognosis is exceedingly unfavorable as regards cure.

In the circumscribed variety, the morphea of Erasmus Wilson, the affected spots are limited in area, the spots being flat or raised, oval or rounded. Their color varies from a light pink to a pale or dark violet, and undergoes changes which ultimately give the lesion a characteristic aspect: a whitish-brown squamous centre surrounded by a bluish or lilac pigmented border, or ring. They are seldom painful, though pruritus is sometimes complained of. The spots, of which there are generally but two or three, are usually located upon the neck, the chest, the abdomen, the arms, or the thighs. These spots gradually fade away, but, occasionally, cicatrices are left

to mark the location of the lesions. The prognosis in this form is favorable.

In sclerodactyly the third phalanx becomes atrophied and its tissues, including the nail, are partially destroyed by abscess. The flexor tendons are contracted and give the finger the appearance of an angular hook by flexing the first phalanx upon the second. Here also the skin is hard, contracted, adherent to the bones, and lilac in color. The prognosis is necessarily unfavorable, owing to the mutilations caused by the disease.

Diagnosis.—The only condition with which scleroderma can be easily confounded is leprosy, but the tubercles of the latter disease, the broad dissemination of the skin-lesions, the nasal disorder, the character of the ulcerations, and the disturbances of sensation usually facilitate its recognition.

Literature of '97-'98-'99.

Diffuse scleroderma must sometimes be distinguished from brawny, solid œdema, met with at times in patients with long-standing renal or cardiac disease, in which there is induration following chronic dropsy. In scorbutic sclerosis there may be parchment-like immobility of the skin, due to extensive subcutaneous hæmorrhages, involving the muscles. In the stage of swelling it may resemble myxœdema. In Raynaud's disease the infiltration, pigmentation, and extreme cyanosis are not wholly unlike those of scleroderma. The increase of pigment may suggest Addison's disease, since the bronzing may be extreme. Osler (*Jour. Cutan. and Genito-Urin. Dis.*, Feb., Mar., '98).

Case of diffuse scleroderma in a man of 41 years with total atrophy of the thyroid gland and bronzing of the skin. The scleroderma affected the hands, the face, the chest, the abdomen, and the lower extremities. Sensation, both for temperature and pain, was normal; the electrical reactions were practically unchanged; the sweat-secretion was not disturbed. Atrophy of the thyroid gland

has been found in other cases of scleroderma, but it was generally secondary; in this case it seemed to precede the skin-changes. Uhlenhuth (*Berl. klin. Woch.*, Mar. 6, '99).

Etiology and Pathology.—Scleroderma is a trophoneurosis, most frequently observed among neurotic subjects and often in connection with the rheumatic diathesis. It may appear at any age, but is more prevalent among women than men. The neurotic influence, however, does not account for all cases, nerve-changes being wanting in the majority. Kaposi notes that the lesions follow, to a degree, vascular distribution. The morbid changes peculiar to scleroderma include an endoperiarteritis, which may be traced to various structures, the muscles, the myocardium, the uterus, the lungs, and the kidneys particularly. The sclerosis would thus seem to be a result of the vascular disturbances, through impaired nutrition of the affected areas.

Treatment.—The treatment consists in nutritious diet, iron, and codliver-oil in ascending doses (the latter up to 10 tablespoonfuls per day); sodium salicylate; externally, steam-baths, mud-baths, mercury, galvanism, and massage. The most recent remedy is thyroid gland; but, according to Osler, it is not of much value. Brocq recommends electrolysis, at first at comparatively short intervals; then, when amelioration is manifest, at much longer intervals. Electrolysis does not act by destructive action, but at a distance, influencing even patches not touched. Philippsohn obtained excellent results by the administration of salol, in doses of about 7 to 15 grains, three or four times daily.

SCLEROSIS OF THE BRAIN.—Sclerosis of the brain is a condition which results from a chronic inflammation of

the cerebral tissue, which inflammation may arise primarily in the connective tissue or secondarily by extension or contiguity, and is analogous in many respects to that inflammatory action which is associated with cirrhosis of the liver. The connective tissue of the brain is of two distinct varieties, one of which, the neuroglia, is derived from the ectoderm and forms the net-work or mesh which holds together the central nerve-cells and ganglia of the brain-substance proper; the other, derived from the mesoderm, forms the basic substance of the meninges and the sheaths and supporting structure of the blood-vessels, being identical with the ordinary fibrous or connective tissue found elsewhere throughout the body. Both varieties are concerned in this process of sclerosis (induration or hardening).

Osler suggests a convenient division of the cerebro-spinal sclerosis, from an etiological stand-point, into degenerative, inflammatory, and developmental forms.

Under the head of degenerative forms he includes: (a) the common degeneration which follows when nerve-fibres are cut off from their trophic centres (the severance of portions of neurons from the main portions containing the nuclei); (b) toxic forms following poisoning by lead, ergot, syphilis, etc.; (c) the sclerosis associated with senile changes in the smaller arteries and capillaries in the convolutions. Some forms of insular sclerosis (*sclérose en plaques*) are probably due to primary alterations in the blood-vessels; it is not proved, however, whether these cases are caused by impaired nutrition resulting from lesions of the capillaries and smaller arteries, or whether the lesion is a primary degeneration of the nerve-cells and fibres to which the sclerosis is secondary.

The inflammatory sclerosis include

secondary forms which develop in consequence of irritative inflammation about tumors, foreign bodies, hemorrhages, and abscesses. These are chiefly vascular (mesodermic) sclerosis, arising from the connective tissue about the blood-vessels. A similar change may possibly follow the primary, acute encephalitis, which Strümpell holds is the initial lesion in the cortical sclerosis found in infantile hemiplegia.

Osler's third group, the developmental sclerosis, are believed to be purely neuroglial (ectodermic) in character, and embrace the new growth about the central canal in syringomyelia; the sclerosis of the dorsal columns in Friedreich's ataxia; and, perhaps, the congenital diffuse cortical sclerosis without thickening of the meninges. If both the ectodermic and mesodermic connective tissues be involved, the resulting sclerosis will be of a mixed character.

When considered by their appearance, distribution, and anatomical formation, cerebral sclerosis are known as miliary, diffuse, tubercular, and insular sclerosis.

Miliary sclerosis is a name for several different conditions. In one variety there are small nodular projections, varying from one-half to five or more millimetres in diameter, upon the surface of the convolutions; single nodules are not uncommon; they may be found sometimes in great numbers. Gowers reports a case in which grayish-red spots were found located at the junction of the white and gray matters; the neuroglia was in an hypertrophic condition.

Diffuse sclerosis may involve a single lobe (*sclérose lobaire*) or an entire hemisphere. This condition occurs most frequently in idiots and imbeciles. In extensive cortical sclerosis of one hemisphere the ventricle is usually dilated (Osler). The region affected and its ex-

tent will determine the symptoms, although there may be no symptoms and but little noticeable impairment of the mental powers. There is, in the majority of cases, hemiplegia or diplegia, with idiocy or imbecility.

Tuberous sclerosis, also known as hypertrophic sclerosis, is applied to a condition in which there are opaque, white, firm, projecting areas located upon the surface of the convolutions, which may not affect the symmetry of the convolution, but give it an increased size and density and a change in color.

These three forms are only of interest to neurologists and alienists.

Insular sclerosis, or *sclérose en plaques*, is defined by Osler as a chronic affection of the brain and cord in which the nerve-elements are more or less replaced by connective tissue. It may occur in the brain or cord alone, but is more commonly found in both.

Symptoms.—According to the varying location of the foci, the symptoms may be, to a certain degree, variable, and the majority of the classical symptoms may be absent. The development of the disease is slow and the course is chronic. Feebleness of the limbs, with irregular pains and stiffness, is the earliest symptom. The resemblance is sometimes very close to spastic paraplegia with great increase in the reflexes.

Later three important symptoms appear: volitional tremor, or so-called intention tremor; scanning speech; and nystagmus.

Volitional tremor is a trembling that comes on when muscular action is attempted. The tremor may be noticed in the extremities or head. When the patient is quiet the tremor disappears.

By scanning speech is meant that in reading or speaking each word is pronounced slowly or separately, or each

syllable may be accentuated. This is a common feature. Nystagmus, a rapid oscillatory movement of the eyeballs, generally horizontal, is an important symptom. Optic atrophy, though not so frequent as in tabes, is sometimes present. The sphincters are usually unaffected until late in the disease. In most cases sensation remains intact. Mental debility is not infrequently present. Vertigo is not uncommon; there may be sudden attacks of coma, as in general paresis. Remissions occur, sometimes at intervals of many years, in which all the symptoms may greatly improve. In all cases in which paresis of one or of several extremities disappears only to reappear much later on, insular sclerosis must be suspected (Buzzard).

Diagnosis.—The symptom-complex of volitional tremor, scanning speech, nystagmus, and more or less spastic weakness of the legs usually renders diagnosis easy in typical cases. In its early stage it resembles very closely hysteria; the nystagmus, the vesical disturbances, and the volitional tremor will be useful in differentiating them. The tremor in hysteria is not volitional. Paralysis agitans and certain cases of general paresis simulate this disease so closely that, near the end of the disease, differentiation may be impossible.

Westphal's *pseudosclérose en plaques* is still more difficult to differentiate.

Literature of '97-'98-'99.

Diffuse sclerosis of the brain is not a congenital affection, but it attacks previously-healthy individuals. It is quite distinct from multiple sclerosis. The differential diagnosis between diffuse cerebral sclerosis and cerebral tumors is very difficult on account of the extreme rarity of the affection. O. Heubner (*Charité Annalen*, xxii, p. 293, '97).

Disturbance of vision is the initial symptom of multiple sclerosis, and is by

no means rare. Frequently it is difficult to elicit the symptoms, however, for the patients have forgotten it. It is particularly important, because in many cases it renders possible the differential diagnosis between multiple sclerosis and syphilis of the brain. Frank (Deut. Zeit. f. Nervenk., Dec. 22, '98).

Etiology.—The etiology of this disease is obscure. Scarlet fever and other infectious diseases have been referred to in this connection. Although not infrequently occurring in children, it is most common in young adults. Trauma, congenital predisposition, and metallic poisons have been mentioned as etiological factors.

Two cases, due to influenza, in which sclerous encephalitis was consecutive to an infectious circumscribed arteritis. H. Rendu (Comptes Rendus Heb. des séances de l'Acad. des Sci., Paris, Dec. 21, '94).

Pathology.—The grayish-red areas are scattered indifferently through the white and gray matters (E. W. Taylor). The sclerosed patches are most abundant in the neighborhood of the ventricles, and in the pons, cerebellum, basal ganglia, and the medulla; histologically in the sclerosed patches there is marked proliferation of the neuroglia, the fibres of which are denser and firmer; the gradual growth destroys the medulla of the nerves, but the axis-cylinders persist in a remarkable way (Osler). Redlich, of Vienna, finds several processes: either there is a pronounced thickening of the neuroglial tissue, containing the remains of the nerve-fibres, above all, of bare axis-cylinders, or it will be found that, with a relatively slight alteration in the neuroglial tissues, the nerve-fibres are missing, in which case a fine, thin network has replaced them. Redlich does not believe it proved that the process originates as an inflammatory one in the vessels, or that the neuroglial prolifera-

tion is the primary factor, but rather inclines with O. Huber to the opinion that the process is one of degeneration affecting particularly the nerve-fibres. He explains the presence of the volitional tremor as a functional weakness of the nerve-apparatus, as there is no anatomical localization for this symptom. He classes nystagmus with the volitional tremor as having no anatomical localization. Scanning speech is most likely referred to the sclerotic areas in the pons and in the medulla oblongata (its favorite location); speech must naturally be first to suffer from areas of sclerosis in the bulb, since it requires the finest innervation, being the most complicated of the physiological processes.

Prognosis.—The prognosis is unfavorable. The patient becomes bedridden unless he dies in the meanwhile of some acute disease.

Treatment.—No known treatment has any influence on the progress of sclerosis of the brain, but a prolonged course of nitrate of silver may be tried, and arsenic is recommended (Osler).

C. SUMNER WITHERSTINE,
Philadelphia.

SCORBUTUS (SCURVY).

Definition.—A general disease characterized by marked adynamia, spongy gums, and a tendency to hæmorrhage, due to deficient or improper food.

Symptoms.—The first sign of the disease is fatigue and general depression, accompanied sometimes by muscular pains in the back and calves. Pallor, loss of flesh, and anorexia follow, and the typical sign of the disease then appears: swollen and spongy gums that bleed upon slight contact or pressure. The gingival mucous membrane becomes bluish and is more or less ulcerated, the ulcers sometimes reaching the deeper

tissues and causing necrosis of the alveolar process. The breath, owing to the presence of necrotic tissues, becomes exceedingly foul. The teeth, at first loosened, may fall out. The tongue is swelled and red; this with enlargement of the maxillary, sometimes adds much to the patient's discomfort. The temperature is often subnormal.

Hæmorrhagic spots of various forms and size appear over the surface. In some cases they resemble ecchymoses; in others, purpura, petechiæ, pemphigus, lichen, and other cutaneous disorders, the skin in all being rough and dry. The hæmorrhages may be deep-seated, giving a bosselated appearance to the limb affected. Hæmorrhages from the nose, stomach, bladder, and intestines may also occur, complicated, in some instances, by extravasations into the pleura, pericardium, meninges, and joints. The latter, especially the ankles and wrists, are sometimes œdematous. Necrosis of the bones, epiphyses, and of the callus, in recently-fractured bones, is observed. Cardiac disorders frequently appear. The pulse becomes weak, irregular, and rapid; the area of dullness is increased, and a hæmic murmur at the base is often distinguishable. The urine is usually albuminous and dark, the phosphates being increased. Its specific gravity is always high. Disturbances of vision are occasionally complained of. Attacks of syncope and delirium are common, convulsions are sometimes witnessed, while hemiplegia also occurs as a complication of the later stages. The mortality from this disease, which is infrequent nowadays, owing to protective legislation bearing upon the food-supplies of ships, is not great. Death usually occurs from heart-failure, hæmorrhage, etc., or as a direct result of some intercurrent disorder.

Literature of '97-'98-'99.

Epidemic of scurvy in Russia. In one particular district (that of Sviaga) the disease began in most patients with hæmorrhages in the popliteal region or (more rarely) in the neighborhood of the ankle, and the affection of the gums was a later symptom. In some 5 per cent. of the total number of patients the gums were entirely unaffected. In a few cases the hæmorrhages appeared at the bend of the elbow or at the wrist-joint. Ulcers were occasionally present. Editorial (*Vratch*, No. 29, '99).

Etiology and Pathology.—Scurvy has become almost extinct, owing to the changes brought about in the food supplied to the crews of ships, in prisons, work-houses, barracks, etc. What the precise elements are is still a subject of controversy, but the best evidence tends to show that the disease is due to the insufficiency or absence of the potassium salts, the organic salts of fruit and vegetables, which, individually or collectively, maintain the alkalinity of the blood up to its proper standard, through the carbonates derived from them. These failing, acid intoxication results, affecting not only the tissues proper, but the blood also, especially in respect to its coagulability. The blood is rendered dark and fluid, and resembles that of profound anæmia without leucocytosis. According to Wright (*Army Med. Rep.*, '95), the presence or absence of acid intoxication may be ascertained by determining the total acid which is being excreted in the urine. In acid intoxication there is a notable increase of the ammonia-neutralized acid excreted as compared with the free acid. Contrary to general belief, it is not the citric acid of lime-juice which is beneficial in scurvy, citric acid having proved useless when administered alone; the antiscorbutic effects are due to the potash salts which lime-juice contains. The disease has been ascribed by others

to a micro-organism or its toxins, but efforts to isolate a specific germ have so far remained fruitless.

Literature of '97-'98-'99.

Scurvy is a chronic ptomaine poisoning, the ptomaines being derived from badly-preserved milk, tinned meat, or salt beef. If the provisions were well sterilized and no subsequent changes took place in the food, there would be no scurvy in the ship's crew, and it would be unnecessary to take preserved vegetables or lime-juice. Regular exercise, fresh air, and temperate habits also conduce to freedom from scurvy. Nansen (*Northwestern Lancet*, Nov. 1, '97).

In almost every case where scurvy has broken out among troops, seamen, or small communities, there is a history of salted meats that gave out an offensive odor when cooking. During the construction of the C. P. R. R., between Winnipeg and the Great Lakes, scurvy (blackleg) was a common complaint. The salt pork that formed the staple article of diet was rank and rusted, and frequently so unpalatable that even hungry laboring-men could hardly eat it. Cases have been observed among Italian laborers who boarded themselves in miserable little huts along the right of way during construction. Their food consisted principally of flour, beans, peas, and salt pork; no fruit and rarely potatoes. The salt pork in these cases was apparently sound, well-cured meat, similar in quality to what the contractors and their own men lived on, but in addition these latter had canned fruits and potatoes. No cases of scurvy occurred on the line outside of the Italians. R. M. Simpson (*Manitoba and West Canada Lancet*, June, '98).

In Russian epidemic in every instance the occurrence of scurvy was entirely due to lack of food, and, when the relief measures were put in force, scurvy disappeared. There was no evidence whatever that scurvy could become infectious. Children, it was observed, who were suckled by scorbutic mothers, in no instance developed the disease. Editorial (*Vratch*, No. 29, '99).

The pathological features, beyond those described under SYMPTOMS, consist in parenchymatous changes in the viscera, notably the heart, liver, and kidneys.

Prophylaxis.—Scurbutus has almost totally disappeared, owing to the wise laws enacted by the various maritime countries, and the conversion into transportable articles of diet of fresh vegetables and fruits, which formerly were classed as perishable property. Ships and armies can now be fully supplied with these antiscorbutic articles in sealed cans and jars, and any number of men can be protected for any length of time.

Treatment.—If the prevailing view in respect to the pathogenesis of the affection is correct, there are three main indications: (1) to supply the scorbutic organism with fixed alkalies to replace those which have passed out in the urine with the excessive acid of the food, (2) to give remedies which at the same time shall relieve the defect of blood-coagulability, and (3) to combine these *desiderata* with portability and inexpensiveness in the drugs. Wright (*loc. cit.*) contends that lime-juice and fresh vegetables do not fulfill the latter condition, and that the use of non-poisonous organic acid salts of potash and soda are necessary. He recommends 30 to 60 grains of Rochelle salts by the mouth daily, and 20 grains of chloride of calcium three times a day to enhance the blood-coagulability.

Fresh fruit, especially lemons, oranges, vegetables, potatoes, cabbage, lettuce, etc., freely eaten, soon bring on convalescence, however, especially when combined with eggs, meats, fowl, milk, and other foods calculated to increase the patient's vigor. Remedies should only be used to counteract constipation or to alleviate the oral lesions by local appli-

cations (see STOMATITIS) tending to correct the fœtor and relieve the surfaces of *detritus* and discharges. Cleanliness of the mouth is important; this is best obtained by means of a solution of borax, 20 grains to the ounce.

SCORBUS, INFANTILE.

Definition.—A constitutional disease probably identical with scurvy of adult life, but occurring in children and usually in those under ten years of age.

Although the disease is often associated with rickets, there appears to be no necessary connection between them. Many cases have been described under the title of "Acute Rickets."

A disease observed in infants characterized by acute pains in the limbs, especially in the direction of the long bones; frequent gastric derangements; leaden hue of the surface, with occasional œdema of the extremities, and hæmorrhagic spots. De Mussy (La Méd. Mod., Dec. 10, '92).

Symptoms.—The disease generally shows itself by great tenderness in the lower extremities and unwillingness on the part of the child to move them or have them moved. Following this some swelling may be discovered in the shafts of the leg or sometimes about the knee or ankle, in one limb or both. Sometimes no swelling can be discovered. In other cases other parts of the body are affected. The back becomes weak; the joints themselves are uninvolved; anæmia, debility, and ecchymosis may appear. The gums become swelled, spongy, and usually of a purplish blue, and often cover the teeth. Sometimes fractures of the bones take place. The eyes may become very prominent.

Literature of '97-'98-'99.

Infantile scorbutus occurs in every grade of life, but is more frequent among the rich than among the poor. It may

appear at any period of infancy or early childhood, but is most common between the ninth and fourteenth months. The essential symptoms are divided into two groups. In the first, or primary, group are: pain on motion, painful swelling of the lower extremities, and spongy and bleeding gums. The secondary symptoms are: subcutaneous hæmorrhages, pseudoparalysis, and hæmorrhages from the cavities of the body. Pain on motion is a constant symptom; it develops early, and is frequently so intense as to cause the child to cry out at the slightest jar or motion. In the early stages it is frequently difficult to determine its exact seat. Painful swelling of the lower extremities is one of the most characteristic and constant symptoms; the upper extremities are rarely involved. The thigh is affected more frequently than any other region. The swelling is above and not at the knee-joint, as in rheumatism. The gums are purplish, soft, spongy, and bleeding, and frequently show decided ulcerations. When the teeth have not come through, changes in the gums are usually slight or entirely absent. Subcutaneous hæmorrhages as well as hæmorrhages from the cavities of the body are very common, but are not necessary to a diagnosis of scurvy. A varying degree of immobility of the extremities is also common, and the condition is frequently so marked as to simulate paralysis. Fever is often present, and is usually intermittent in character. Diarrhœa is more frequent than constipation. Crandall (Archives of Ped., July, '97).

Diagnosis.—The diagnosis rests upon the extreme tenderness and pain on handling, the subperiosteal swelling, and the spongy gums. The disease is often at first confounded with rheumatism, from which it is to be distinguished by the fact that there is no inflammation of the joints present. Rachitis, although sometimes combined with it, is to be distinguished from it by the presence of the rosary and often rickety symptoms, and by the absence of hæmorrhages and

intense pain. This disease can scarcely offer any difficulty.

Besides pallor and anæmia there is a group of symptoms that is characteristic: 1. A fusiform or cylindrical swelling of one or both thighs, due to subperiosteal hæmorrhage about the shaft of the femur. This may involve the upper part of the leg also. 2. The gums will be found to be swelled, spongy, dark purple in color, bleeding freely on touch, or perhaps covered with dry blood. 3. A dark circle about the eye, as if a blow had left a "black and blue" mark. The tendency throughout the disease is to hæmorrhage. These symptoms should always enable one to distinguish the disease from rickets. Other diseases which may be mistaken for scurvy are acute rheumatism, infantile paralysis, periostitis, abscess of hip or knee, and sarcoma. Other conditions to be remembered in making a differential diagnosis are hæmophilia, leucæmia, purpura hæmorrhagica, and erythema nodosum. W. F. Cheney (N. Y. Med. News, Feb. 29, '96).

Literature of '97-'98-'99.

Infantile scurvy may be mistaken for rheumatism, stomatitis, rickets, sarcoma, osteitis, and infantile paralysis. The result of antiscorbutic treatment is one of the most certain means of diagnosis. Crandall (Archives of Ped., July, '97).

The earliest cases of infantile scurvy reported were erroneously described as cases of acute rickets. With reference to the differential diagnosis, congenital syphilis can be excluded by the history and by the absence of syphilitic lesions on the skin and mucous membranes. In congenital syphilis there is never a history of severe pain. The pseudoparalyses of syphilis are limited nearly always to the upper extremities; the swelling is never so intense as in cases of infantile scurvy, and is more prone to occur on the epiphyses than on the diaphyses. Separation of the epiphyses occurs in both diseases. Isaac Abt (Med. Rec., June 11, '98).

There are two affections occurring in children for which scurvy is particularly

mistaken: acute rheumatism and acute anterior poliomyelitis. There is no reason why scurvy should be confounded with the latter disease. There is, of course, absence of movement in the limbs in both cases, but in anterior poliomyelitis this is due to inability to move them because of palsy. In scurvy the failure of movement is due to pain. This can very easily be decided by passive movements. Scurvy and acute rheumatism are not so easy to differentiate. In scurvy, however, the hæmorrhage is not into the joint and not into the epiphysis, but practically always into the diaphysis of the long bones. Blood-extravasations occur at times over the tissue and occasionally even over the carpus, but these are rare exceptions. If the bones are protected from motion it will be found that the joints in scurvy may be freely moved. At times in scurvy hæmorrhage occurs into the joints, and this may almost hopelessly confound the disease with rheumatism; but these joint hæmorrhages are very rare. Abram Jacobi (Med. News, Oct. 28, '99).

Etiology.—Of the many cases now recorded the majority have occurred in infants between the eighth and twentieth months. Race, sex, and season appear to excite no influence. Children of the better classes seem more prone to the disease. The use of food unsuited to the children seems to be the great cause; but just what the chief fault in the diet may be is not yet determined. Certainly the majority of cases seem to have developed in infants fed upon the proprietary foods.

Literature of '97-'98-'99.

In nearly all the cases that have been reported the infants had been fed almost exclusively on some one of the following foods: Proprietary preserved foods, condensed milk, peptonized milk, sterilized milk, and even barley-water is mentioned as a cause. Northrup, according to Thompson, does not state it any too strongly when he says: "It is a sig-

nificant fact that the country which furnishes most of the literature of scorbutus in children is the same which is posted from end to end with advertisements of proprietary foods." Jacobus (*Med. News*, Jan. 15, '98).

Three hundred and seventy-nine cases of infantile scurvy investigated. The disease is most apt to develop between the ages of seven and fourteen months, inclusive, and has a greater tendency to occur among the rich or the well-to-do. The most important etiological factor is a dietetic one, 214 of the cases (60 per cent.) having been fed on proprietary foods. There does not seem to be evidence that the association of rickets and scurvy is at all intimate. Very possibly the same defect in diet which produces the one produces the other also, but the rapid recovery under treatment which the scurvy underwent did not apply to the rickets. This seems to indicate only accidental association of the two diseases; certainly not on any causal relation between them. Committee Amer. Ped. Soc. (*Med. Rec.*, July 2, '98).

There is probably neither intimate association nor causal relation between scorbutus and rachitis. In the normal diet of young children a food endowed with antiscorbutic power, milk, is found. If this article of food is not fresh, infantile scorbutus is likely to develop; while, on the other hand, the child fed with fresh milk will not contract scorbutus. Among the poorer classes the child eats at the table with his parents and receives nothing but bread and soup. This deficient diet brings on a number of gastrointestinal accidents, and is a very important cause of rachitis. However, these children are not suffering from scorbutus, because they receive antiscorbutic food, potato-soup, for example. Infantile scorbutus may appear in children nourished with sterilized milk only, and it seems as though the boiling or prolonged cooking of milk deprived it of its antiscorbutic properties. Milk, therefore, to prevent the appearance of this disease, should be fresh. Netter (*Sem. Méd.*, Feb. 22, '99).

Pathology.—The most characteristic

change consists of subperiosteal hæmorrhages, which produce the swelling. Hæmorrhage into the muscles is sometimes seen and hæmorrhage under the mucous membranes is common. The marrow is hyperæmic and rich in lymph-cells and leucocytes. (Lunz.)

Prognosis.—The disease tends to run a chronic course except when treated appropriately. Then the recovery is sometimes phenomenally rapid. If recognized and treated, or if severe complications are present, death is not rare.

Treatment.—This consists in correcting the diet and in giving fresh fruit-juices, especially orange-juice. All proprietary food should be abandoned. Sometimes a change from cooked to raw milk seems to be advantageous. Tonics may be needed later, but are of no service for the direct treatment of the scurvy.

Literature of '97-'98-'99.

Marked case treated with boiled milk and a tablespoonful of orange-juice and raw beef-juice. Next day patient somewhat better, but the pain still present. Ordered the milk not to be boiled and a few drops of lime-juice in addition, to be given twice a day. Three days after the diagnosis was made and change of diet begun the swellings were smaller and the pain had evidently entirely disappeared. L. S. Hughes (*Australasian Med. Gaz.*, Oct. 20, '97).

Brilliant results are obtained by providing a suitable diet, such as fresh cows' milk, or mothers' milk; beef-, orange-, or lemon-juice; fresh vegetables, mashed potatoes, etc. The child should be placed under the best possible hygienic conditions, good ventilation be provided, and under favorable conditions of weather the child should be out-of-doors. Cod-liver-oil is especially indicated upon recovering from the scorbutic condition. Abt (*Med. Rec.*, June 11, '98).

Infantile scorbutus is the result of destructive changes in the intestinal tract, leading to disturbance of assimila-

tion. A certain degree of autointoxication may possibly complicate the process, but this cannot be the most important element. A condition of the bones, similar to that occurring in rachitis, certainly does not exist. It will be impossible to produce any improvement in any of these cases until radical changes are made in the method of nursing and the environment, as the monotony of the treatment, as much as any other element, appears to have injurious effect. A. Baginsky (Deut. med. Woch., May 4, '99).

J. P. CROZER GRIFFITH,
Philadelphia.

SEBORRHŒA (STEARRHŒA).

Definition.—A disease of the sebaceous glands, due to one or more micro-organisms, characterized by an increase in the amount and alteration in the character of the glandular secretion and the formation on the scalp and other cutaneous surfaces of an oily coating and fatty scales.

Varieties and Symptoms.—There are three main forms of seborrhœa:—

SEBORRHŒA CAPITIS, often termed pityriasis, an advanced form of what is popularly known as "dandruff." It is characterized by a desquamation of the scalp, and occasionally of neighboring hair-covered regions: the eyebrows, beard, etc. The scales are grayish white, thin, and fine, and fall in such quantities at times as to resemble a thick coating of dust on the patient's clothing, especially the collar and shoulders. Slight itching is sometimes complained of, and falling of hair may occur. It is a stubborn affection, which simulates eczema in some cases.

SEBORRHŒA SICCA.—This is a milder form of dandruff very commonly observed. Besides its area of predilection, the scalp, seborrhœa is often occasionally found in various regions, the face of children and young women, the beard,

the back between the shoulder-blades, etc. The yellowish-white scales formed accumulate over the affected region, and the uppermost scales fall off as a scurf as soon as they become dry, in the form of fine, pellucid, glistening scales. Hairs are often lost, especially at the vertex, constituting alopecia furfuracea.

SEBORRHŒA OLEOSA is generally limited to the face and is due to hypersecretion from the sebaceous glands. As a result, the skin is covered with an oily coating, which gives the region a shiny appearance. Upon the application over the affected area of a piece of absorbent paper, a large number of fine grease-spots will appear, corresponding to the glandular orifices. Dust may accumulate in the latter, constituting the so-called seborrhœa nigricans. The skin may preserve its usual color or appear congested and thickened. Seborrhœa oleosa is often observed in drunkards, and may occur as a complication of acne rosacea. (See also ECZEMA, volume iii.)

Etiology and Pathology.—Sabouraud has recently expressed the view that the causal organism of alopecia areata was also that of seborrhœa. He holds that when the microbe becomes implanted in the pilo-sebaceous follicle it sets up an epithelial overgrowth which encysts groups of the organism; these are ultimately expelled as plugs. Four successive stages may then result: a sebaceous hypersecretion of oily fluid, a gradual enlargement of the sebaceous gland, a progressive atrophy of the infected follicle, and finally death of the hair. These stages correspond to the various forms of seborrhœa, to which pityriasis is often added through secondary infection. Brocq favors a plurality of pathogenic organisms, probably saprophytes, especially in the cases complicated with eczema, which organisms are capable of

becoming pathogenic under certain conditions and in appropriate soil.

Literature of '97-'98-'99.

Search for the germ of seborrhœic eczema, or seborrhœitis, and in the scales of a series of cases. Seborrhœa is caused by a specific germ or germs, in form diplococci, whose life-history is most active at the ordinary temperatures and with free access of the air, but which can develop at much higher and lower temperatures, and with a scarcity of oxygen. Merrill (N. Y. Med. Jour., Mar. 6, '97).

Treatment.—In many of these cases, if not in all, there is an underlying dyscrasia which must be met by appropriate measures. The gouty and rheumatic diatheses prevail in many; neuroses are often traceable in the individual or personal history; a lymphatic temperament is usually observed in children; anæmia is a frequent accompaniment of the disease in young women. The salicylates are of value in the first; strychnine and arsenic in the second; the iodides and iron in the third, and iron and arsenic in the fourth class of cases. A carefully regulated, but nutritious, diet is necessary, the avoidance of much meat being indicated in gouty individuals.

In dry seborrhœa Brocq recommends the following:—

℞ Betanaphthol, 4 $\frac{1}{2}$ grains.
Camphor,
Resorcin, of each, 3 grains.
Precip. sulphur, 45 grains.
Vaselin, 5 drachms.—M.

This ointment is applied carefully to the scalp by parting the hair in many places, removing any excess with a soft handkerchief. Next morning the head is cleansed with a little ether. In oily seborrhœa Brocq applies the following lotion, three times a week, in the same manner as the naphthol mixture:—

℞ Sulphur, 6 $\frac{1}{2}$ drachms.
Camphorated alcohol, 1 $\frac{1}{2}$ ounces.
Glycerin, 1 $\frac{1}{4}$ ounces.
Distilled water, 6 $\frac{1}{2}$ ounces.—M.

Lassar, in cases in which sulphur cannot be conveniently used, applies the following salve three times a week, or less often if it proves irritating:—

℞ Pilocarpine, 30 grains.
Vaselin, 20 grains.
Lanolin, 80 grains.
Essence of lavender, 25 drops.—M.

To cleanse the scalp a solution of bicarbonate of sodium, 5 drachms to the quart of water, may be employed. A borate-of-sodium solution, 1 $\frac{1}{4}$ drachms to the pint, is more effective when the scalp is very oily. This solution should be used once a week and the following wash used daily with a soft tooth-brush, parting the hair in many places:—

℞ Tannin, 15 grains.
Alum, 1 drachm.
Rose-water, 6 ounces.—M.

Skinner recommends the following lotion, which serves as a tonic to the scalp and tends to encourage the growth of hair:—

℞ Tinct. of cantharides, 14 drachms.
Tinct. of cinchona, 2 ounces.
Tinct. of benzoin, 6 drachms.
Spirit of lavender, 1 $\frac{1}{2}$ ounces.
Castor-oil, 2 drachms.
Alcohol, enough to make 10 ounces.—M.

The castor-oil should be dissolved in the alcohol, then mixed with the tinctures and spirit, and filtered through kaolin.

When there are incrustations, which are often observed in children and aged people, the crusts should be poulticed off and their bases anointed with the following salve:—

R Ichthyol, 45 grains.
 Lanolin,
 Vaseline, of each, $\frac{1}{2}$ ounce.—M.

SEPTICÆMIA AND PYÆMIA. See
 WOUNDS, SEPTIC; AND GANGRENE.

SHOCK.

Definition.—A general depression of the vital functions due to lowered blood-pressure, brought on by vasomotor paresis of central origin, and occurring either as the result of considerable loss of blood, the accumulation of blood in the larger abdominal venous trunks, or contusion of the sensory nerves.

Symptoms.—Shock may present itself in forms varying in intensity from slight depression to profound collapse approximating death. The surface is pale or livid and cool; the eyes are staring or half-closed; the respiration is shallow and irregular; the pulse weak and rapid or imperceptible. These symptoms in severe cases are accompanied by loss of consciousness. The weakness of the muscles is a striking feature, those of the surface being flabby and impotent; the sphincters also fail to functionate from this cause, and involuntary evacuations result. Hiccough and vomiting are also frequent manifestations. The mind is dull and apathetic. Hypothermia, though seldom reaching to 3° F., is usual. The mental torpor gradually deepens, syncope comes on, and death follows. This course depicts that observed in great injury involving considerable loss of blood, complicated probably with abdominal or cerebral lesions. Neurotic individuals and drunkards are also exposed to this rapidly fatal form.

In some cases the picture is quite different. Maniacal *furor* seems suddenly to develop, and the patient throws himself or his limbs in every direction, rolls his eyes, strikes right and left, and cries out

at the top of his voice. Usually exhaustion soon comes on through recurrence, probably, of hæmorrhage on account of the violent exertion, and the patient lapses into the form previously described.

In cases that proceed favorably, the change for the better is termed the "reaction." All the abnormal symptoms disappear gradually, the return of the muscular tone being manifested by turning, shifting position, etc., while the cardiac symptoms lessen in intensity as the facial color returns. Some cases at this stage go through the maniacal type of shock through unduly rapid resumption of cerebral blood-pressure. In some cases it becomes a sign of septic infection. The temperature in a favorable case remains near the normal, though it may exceed this to a marked degree in children without indicating that a complication has occurred. This reaction fever sometimes lasts a couple of days, then gradually disappears.

Etiology and Pathology.—The prevailing view is that shock is mainly due to reflex paresis of the vasomotor centres, as a result of violent commotion or contusion of sensory nerves. Mechanical injury of the abdominal organs is also capable of inducing this central disturbance. Goltz's well-known experiments in this direction were recently repeated by Parascandola (*Archives de Pathologie*, p. 138, '98), who utilized guinea-pigs instead of frogs. He stretched the animals out flat by their feet and gave them a sharp blow upon the abdomen with a flat ruler. The animals reacted in various ways to the traumatism; the greater number of them, after a period of temporary quiet, became apparently well; but in from thirty-six to forty-eight hours they died with the symptoms of exhaustion or shock. The cerebrum, cerebellum, medulla, and cord were removed and preserved in appro-

priate fixatives, and studied by the Golgi, Marchi, and Nissl methods. The alterations found by the Golgi method consisted in a deformity of the cell-body advancing to the grade of actual atrophy, node-like swellings on the dendrites, and fragmentation of the same. By the Marchi methods he noted simple marginal degeneration of Lissauer's zone and of the posterior roots proceeding to degeneration of the posterior columns; in some instances Gowers's tract, the crossed pyramidal, and the direct cerebellar tracts were involved, and sometimes there was a total degeneration of the entire cord. As observed by the methods of Nissl, the cytological alterations were various, but pronounced. Chromatolysis was present in a large number of cells. In those affected in a mild degree only, the chromatolysis was more peripheral than central; in the severer grades the chromatolysis was complete. In a large number of the cells peculiar abnormalities in the distribution of the chromophilic granules were noted; there were peculiar perinuclear bonnet-shaped masses, or fusiform, or like a crown about a rarefied perinuclear space. Further changes in the protoplasm were noted, rarefaction going on to vacuolization and to total disappearance of the cytoplasm. Changes in the achromatic reticulum were noted by the author, consisting in a widening of the mesh and a contraction of the protoplasm within the mesh, resembling an atrophy. Changes in the nucleus were also observed. At times there was an unimportant dislocation, but the gravest changes consisted in a vesicular swelling of the nuclear protoplasm, which varied to a notable degree—at times very slight, at times marked. In some sections there were pronounced abnormalities in the coloration of the nucleus.

As a result of the central disorder, the vasomotor system becomes more or less incompetent, and reduction of the blood-pressure follows; the peripheral and cerebral vessels are depleted, while the larger trunks within the abdominal cavity are engorged. This explains the greater danger of a fatal issue when much blood has been lost, the medullar and spinal changes being thus accentuated.

Literature of '97-'98-'99.

Shock in obstetrical surgery is most apt to occur in fat, neurotic women living in comfortable circumstances, and sometimes accustomed to luxury. Old primiparæ are especially exposed to this danger. Coe (*Amer. Gynæc. and Obstet. Jour.*, Apr., '97).

In surgical operations performed in high altitudes or in surgical shock everywhere, every possible drop of blood should be saved for the patient. The importance of this precaution increases greatly as higher elevations are reached and the atmospheric pressure is decreased. Anæmic and exsanguinated patients are more subject to surgical shock at high altitudes than at sea-level, and must be more carefully prepared for operation; extra precautions for the prevention of shock must be used at and after the operation. "Increasing shock" after injuries or operations must be construed as strong presumptive evidence of continuing hæmorrhage. It must be made clear that there is no hæmorrhage before the ordinary remedies (cardiac stimulants, transfusion, etc.) are employed. The reflex effect of oozing is to continue shock, which must be regarded as conservative in its tendencies while bleeding is still going on. In treating shock after surgical operations or injuries, the first and most important thing is to arrest completely all further loss of blood. In surgical shock at high altitudes every means should be used for the prevention of shock through the nervous system and the resultant blood-stasis; that is, surface-heat is to be preserved, time is to be saved in operating, and exposure and unnecessary handling

of the viscera are to be avoided. Wetherill (*Annals of Surg.*, Apr., '97).

Prophylaxis.—The prevention of shock during and after operations has received of late years considerable attention. Senn prepares his patients for grave operations by administering 2 ounces of whisky by the stomach or per rectum an hour before the time set for the operation and by injecting $\frac{1}{30}$ grain of strychnine hypodermically a few minutes before anæsthetizing the patient. These prophylactic measures have been found of great value in minimizing the danger from anæsthetics and the shock incident to the operation. He likewise deems it important to prevent a loss of heat, and to favor peripheral circulation by enveloping the body and limbs during the operation.

Literature of '97-'98-'99.

In regard to shock after abdominal operations, stress is laid upon the following points: 1. Shock is often due to prolonged anæsthesia in a badly-ventilated room. 2. Depression of the vital powers may be due to prolonged exposure of the patient, to wetting of the clothing, or to contact of wet towels with the skin: the patient should be kept warm and dry. 3. Anæmia of the brain can be prevented by operating in the Trendelenburg position. 4. Anæmia of the heart can be prevented by having the arteries well filled before operation (by giving large quantities of fluid during the preceding day or two), by filling the abdomen with normal salt solution during the operation, or by rectal enemata or transfusion afterward. 5. The administration of strychnine in doses of $\frac{1}{20}$ grain for three days before and three days after the operation diminishes shock, partly because it keeps the intestines contracted, and thus saves them from being handled, partly because it stimulates even a badly-fed heart. 6. The intestines should, as far as possible, be empty at the time of operation. This can be brought about by dieting, careful catharsis, and the use of strychnine. 7.

Important organs, such as the uterus, kidney, or pieces of intestine, may be removed with little shock, provided that the operation is performed quickly, with little hæmorrhage, and without much handling or exposure of the intestines. A. Laphorn Smith (*Canada Med. Rec.*, May, '97).

In order that patients should be in the best possible condition for operation, they should be prepared by moderate and judicious stimulation. Commencing six hours before the operation they receive from 1 to 3 teaspoonfuls of whisky in 1 ounce of hot water every hour until the time for operation. Two hours before operation 1 or 2 ounces in 4 ounces of warm normal saline solution are passed into the rectum, high above the brim. Intravenous injections of the normal saline solution at a temperature of 115° F., from 1 pint to 3 quarts, as may seem to be demanded by the effect produced, should be used if the patient has lost much blood. The pulse should be watched during the transfusion, and when the desired tension is restored the injection can be stopped. The same can be repeated again in four to twelve hours if occasion demands. Horace T. Hanks (*Amer. Gynec. and Obstet. Jour.*, Sept., '98).

Treatment.—Absolute rest and quiet in the recumbent position, the external application of heat (taking care that the water-bottles or bags used be not too hot, lest they burn the patient) around the trunk and extremities, are the first measures to be resorted to. Senn recommends the inhalation of nitrite of amyl, and the administration of stimulants, such as alcohol, camphor, coffee, and tea. Of alcoholic stimulants, hot red wine, rum, and brandy-punch deserve the preference. If spirits are used, an ounce should be given every fifteen to thirty minutes until reaction is established. Copious rectal enemata of hot normal salt solution are always valuable in the treatment of pronounced shock. Subcutaneous or intravenous infusion of the same solution

is also of value. Opium is contra-indicated in the treatment of uncomplicated shock. Subcutaneous injections of sterilized camphorated oil is deemed by Senn a valuable cardiac stimulant, 3 or "4 hypodermic syringefuls being administered every fifteen minutes until reaction sets in. Electrical stimulation of the phrenic nerves and artificial respiration are indicated. In shock the absorption of all drugs administered by the stomach or rectum, or even injected into the tissues, is always slow; hence, care is necessary to guard against an accumulative action during the recovery of the patient.

Hypodermic injections of saline solution are as effectual as intravenous injections. The fold of the armpit, the retroscapular region, the flanks, buttocks, or outside of the thighs may be chosen. Duret (*Brit. Med. Jour.*, July 4, '96).

Literature of '97-'98-'99.

The treatment of shock following operation may be summed up as follows:

1. Prophylaxis before and during the operation.
2. The patient is to be wrapped in a warm blanket and hot-water bottles or hot bricks and a hot-air apparatus applied.
3. The head and shoulders are to be lowered.
4. Sinapisms to the præcordium are of value.
5. If shock is severe, hypodermoclysis should be performed; if alarming, saline transfusion.
6. An enema of 6 ounces of strong, hot coffee is to be given.
7. Massage of the abdomen and an abdominal compress are of service.
8. The limbs should be elevated with cotton-wool and bandaged.
9. Hypodermic injections of liquor ammoniæ aromaticus in $\frac{1}{2}$ -drachm doses should be administered every fifteen minutes, and atropine sulphate, $\frac{1}{100}$ grain, every half-hour, until reaction sets in. Thomas Leidy Rhoades (*Ther. Gaz.*, Oct. 15, '97).

For the treatment of surgical shock in abdominal and genito-urinary operations, the combination of small and frequently repeated hypodermic injections of strychnine, together with saline in-

jections, is most effectual. Crile (*Amer. Gynæc. and Obstet. Jour.*, Mar., '98).

Among the preventive measures of shock greatest reliance can be placed upon free use of intravenous, hot, saline infusion, injected while the patient is still upon the operating-table. Whenever possible, the solution should be introduced into the median basilic vein, but occasionally a vein in the operating wound will answer the purpose, or, if necessary, the solution may be introduced into the common femoral artery with the aid of an hypodermic needle attached to a fountain-syringe. Next in order of efficiency to intravenous saline infusions are those introduced into the rectum. Hypodermoclysis is the slowest of all the methods; a heaping teaspoonful of common salt to the litre or quart; plain warm water, devoid of sodium chloride should never be used intravascularly, as it may prove fatal by producing a rapid disintegration of the red disks. The proper temperature for the solution is about 150° F. At least 1 litre, and sometimes even 2 or 3 litres, may be injected, providing the precaution is taken to introduce the solution slowly. The time occupied in introducing the fluid should never be less than ten minutes per litre. The employment of intravenous injections before or at the beginning of the operation is not considered good practice, since, by increasing the blood-pressure, it encourages freer hæmorrhage. Robert H. M. Dawbarn (*Boston Med. and Surg. Jour.*, Feb. 22, '99).

A valuable solution for intravenous infusions in shock is that recommended by Ringer, as follows:—

R Calcium chloride, 1 $\frac{1}{2}$ grains.
Potassium chloride, 1 grain.
Sodium chloride, 90 grains.
Water, 1 quart.—M.

Careful asepsis of the arm, apparatus, and solution is insisted upon; also the exclusion of all air from the tube before introducing the cannula. The solution should be free from solid particles. A probe-pointed cannula should always be used. If these points are carefully observed, there is little danger in the proceeding.

The temperature of the solution should be about 100° F.; hotter solutions are of greater value as a stimulant; an initial temperature of 108° to 110° F. is well borne. The fluid is cooled from one to two degrees by entering the cannula. The amount of the solution to be injected at one time varies with the rapidity of the injection and with the quality and tension of the pulse; 1 quart, repeated when necessary, is generally better than a large amount given at one time. The infusions are of most value in shock accompanied by hæmorrhage; the nearer the symptoms approach those of pure shock, other things being equal, the less effective is the infusion. D. F. Jones (Boston Med. and Surg. Jour., Feb. 1, '99).

Patients are personally prepared for grave operations by administering 2 ounces of whisky by the stomach or rectum an hour before the time of operating, and by injecting $\frac{1}{30}$ grain of strychnine hypodermically a few minutes before anæsthetizing the patient. These measures are of great value in lessening the danger from anæsthetics and the shock of the operation. It is also important to prevent loss of heat and favor peripheral circulation by enveloping the body and limbs during the operation. In the treatment of traumatic shock, copious enemata of hot, normal salt solution should never be neglected. In the treatment of pronounced cases subcutaneous or intravenous infusion of the same solution is followed by most encouraging results. The absorption of all drugs is always slow; hence it is necessary to guard against cumulative action. The therapeutic value of strychnine in the treatment of shock is doubtful. Contejeans explains this by the fact that in animals in the state of shock the spinal cord is anæmic and not supplied by sufficient blood to convey the remedy to this centre of innervation. N. Senn (St. Louis Courier of Med., July, '99).

Strychnine should be employed in large doses in severe shock. In one case the injection of $\frac{1}{4}$ grain of strychnine was followed by immediate recovery, but death took place nine hours later. While $\frac{1}{4}$ grain is a rather large dose and should

not be given as a routine practice, there is scarcely any use of giving less than $\frac{1}{10}$ grain when strychnine is really indicated. J. B. Hall (Brit. Med. Jour., Nov. 25, '99).

SILVER. — Silver (argentum) in its pure metallic state has a perfectly white color and a high degree of lustre. It is unaffected by oxygen or moisture, but is readily attacked by sulphur, and tarnishes when exposed to the air containing hydrogen sulphide. The metal is not official, though some of its salts and the oxide are. Of official preparations of silver, the nitrate is most largely used.

Cyanide of silver (argenti cyanidum, U. S. P.) occurs as a white, odorless, and tasteless powder, which turns dark upon exposure to the light. It is soluble in potassium cyanide, ammonia, boiling dilute nitric acid, and in sodium thiosulphate. It is used for making the official dilute hydrocyanic acid, and is rarely used internally.

Iodide of silver (argenti iodidum, U. S. P.) occurs as a light-yellow, odorless, and tasteless powder, which is unaffected by the light, if pure. It is soluble in a solution of potassium iodide or cyanide, and in ammonium thiosulphate.

Nitrate of silver (argenti nitras, U. S. P.) occurs in colorless and odorless rhombic plates, having a bitter, caustic, metallic taste, and is rapidly reduced by organic matter when exposed to the light. It is soluble in 0.6 part of cold and 0.1 part of boiling water, in 26 parts of cold and 5 parts of boiling alcohol. It is incompatible with organic matter, hydrochloric acid, chlorides, phosphates, arsenites, opium, extracts, resin, essential oils, tannin, etc. It should be carefully preserved from light and air. The crystals are alone suited for internal use. For external use two preparations of the

nitrate are official: the fused and the diluted nitrate.

Fused nitrate of silver (molded silver nitrate; lunar caustic; argenti nitras fusus, U. S. P.) is prepared by melting crystals of silver nitrate with 4 per cent. of official hydrochloric acid and running the resultant liquid into suitable molds. It occurs in white, hard, odorless, solid pencils or cones, having a fibrous fracture, and a bitter, metallic, caustic taste. It becomes gray or grayish black upon exposure, and is soluble in water, alcohol, nitric acid, etc.

Diluted nitrate of silver (mitigated stick; mitigated lunar caustic; argenti nitras dilutus, U. S. P.) is prepared by melting 1 part of silver-nitrate crystals and 2 parts of potassium nitrate. It occurs in white sticks and cones, is soluble in water, and is intended for external use where pure lunar caustic is too powerful.

Oxide of silver (argenti oxidum, U. S. P.) occurs as a heavy, odorless, brownish-black powder, having a disagreeable, metallic taste. It is incompatible with ammonia-water, creasote, tannin, acids, etc. It should not be triturated with oxidizable matter, as it may cause explosion. It is best dispensed mixed with some chalk and put in capsules.

Preparations and Doses.—Argenti cyanidum (U. S. P.), $\frac{1}{60}$ to $\frac{1}{20}$ grain.

Argenti iodidum (U. S. P.), $\frac{1}{2}$ to 2 grains.

Argenti nitras (U. S. P.), $\frac{1}{8}$ to $\frac{1}{2}$ grain.

Argenti nitras dilutus, U. S. P. (mitigated caustic).

Argenti nitras fusus, U. S. P. (lunar caustic).

Argenti oxidum (U. S. P.), $\frac{1}{2}$ to 2 grains.

Physiological Action.—Nitrate of silver coagulates albumin, and, when applied in its pure state to living tissues,

coats them over with a tough, white film (albuminate of silver) and acts as a caustic. This caustic action is not, however, a deep one, because the tough film which is formed acts as a protective. In dilute solution its action is astringent, overcoming relaxation and constricting the vessels, and apparently alterative, improving local nutrition.

Taken internally in medicinal doses, silver nitrate acts as a tonic to the nervous system, causes changes in the blood, stimulates the heart, and promotes constructive tissue-metamorphosis and increases the secretion of the bile. Large doses, by reason of its caustic action, produce violent gastro-enteritis, thrombosis of the gastric veins, and ulceration of the mucous membrane of the stomach. On account of its affinity for organic matter, silver nitrate cannot long maintain its identity in the stomach. Bogolowsky (Virchow's Archiv, xlv, 413) has observed that, when silver nitrate is added to a peptone, it is readily dissolved, and that the solution formed does not coagulate albumin; that in this or in some analogous form silver is absorbed is proved by its having been found in various internal organs and by the discoloration which follows its protracted use. The elimination of silver from the body is accomplished very slowly. Heller and Orfila failed to detect silver in the urine of animals taking it; others, however, have detected it in the urine, and it is probable that it is eliminated, though very slowly and in small quantities, by the kidneys. Frascchetti denies that it is eliminated by either the kidneys or the intestines. When silver is taken for a long, continuous period certain changes take place in the skin and mucous membrane which will be considered under CHRONIC POISONING BY SILVER NITRATE.

Poisoning by Silver Nitrate.—There are two forms of poisoning: that following a large single dose (acute) and that following the long-continued use of small doses (chronic).

ACUTE POISONING.—The symptoms of acute poisoning by silver nitrate are partly gastro-intestinal and partly cerebro-spinal. Either series of phenomena may predominate in a case of acute poisoning.

Almost immediately after a poisonous dose of the drug is taken, violent abdominal pain, with vomiting and purging, comes on. At the same time evidences of wide-spread gastro-enteritis develop. The abdominal walls become hard and knotted, more rarely scaphoid. The face becomes flushed or livid, and is covered with sweat. The expression is one of anxiety. When vomiting occurs, the ejecta are brown or blackish in color, sometimes white and curdy, especially after sodium chloride has been given. The lips, skin, and mouth are stained white, but rapidly change in color to brown and then black.

In some cases the nervous symptoms are severe: loss of power of co-ordination, paralysis, and convulsions with coma or delirium may occur. The convulsions are severe, generally tetanic (H. C. Wood), and, according to Rouget, are plainly reflex and persist after the complete abolition of voluntary movements. Curci (London Med. Record, p. 72, '77) affirms that they are due to excitation of the motor tract of the cord, and that this is preceded by a similar influence upon the sensory tracts.

Death ensues from asphyxia due to centric respiratory paralysis (Rouget), accompanied by a profuse exudation of liquid mucus into the bronchial tubes, pulmonary congestion and œdema being found on post-mortem examination. An-

other theory is that the asphyxia accompanied by the excessive secretion and pulmonary congestion is caused by an altered state of the blood induced by the poisonous action of the drug (Krahmer, Rabuteau, Mourier).

In a case reported by Beck (Beck's Med. Jurisprudence, i, 675, Phila., '63) the symptoms were insensibility, violent convulsions, and dilated pupils, with, on a partial return to consciousness, intense gastric pain; complete restoration of consciousness did not return until eleven hours after administration, and the coma returned at intervals during several days.

At post-mortem the stomach and bowels are found corroded, often ecchymosed, and with patches of a white or grayish color. The lungs are congested and the bronchial tubes filled with fluid mucus. Poisoning by this drug is not common. H. C. Wood recalls (1894) but 3 fatal cases. The lethal dose is not certain; 30 grains have killed and recovery has followed the ingestion of an ounce.

Treatment of Acute Poisoning.—The chemical antidote is common salt (sodium chloride), which should be administered in large amounts. Vomiting should then be induced at once, as the chloride of silver formed is soluble in solutions of sodium chloride and in the digestive fluids. Lavage of the stomach with a very soft stomach-tube may be carefully tried. If the stomach cannot be washed out, give large draughts of salt water and produce vomiting alternately. Opium and oils may be given to allay the irritation, and large draughts of milk, or of soap and water, to dilute the poison and protect the mucous membrane of the stomach and œsophagus from the irritant action of the drug. The external bodily heat should be maintained.

CHRONIC POISONING BY SILVER NITRATE.—The prolonged internal use of

any of the soluble salts of silver will give rise to chronic poisoning, or argyria. A local argyria, or argyrosis, may be caused by the frequent topical application of a soluble silver salt for a prolonged period. Discoloration of the conjunctiva and of the cornea has been observed. A few cases have been reported in which general argyria has resulted from the topical use of silver in the mouth and throat (Foster). The first sign of general argyria is the appearance of a slate-colored line along the gums, associated with some inflammatory swelling. Later grayish patches appear on the skin and mucous membranes, and spread over the whole body until the skin has acquired a peculiar bluish-slate color, which may become very dark, and in decided cases the conjunctivæ and the mucous membrane of the mouth are involved. The silver is found in all the tissues of the skin below the rete Malpighii (Frommann, Riemer, Neumann). No organ of the body, except the parenchymatous cells and the epithelium, escapes this pigmentation, which is due to the deposit of silver, in the metallic state, as an oxide or as some organic compound. Although the discoloration is long in making its appearance, the deposition in the tissues probably begins at once and gradually accumulates. This condition of argyria does not seem to affect the general health. Foster believes that it is not improbable that in all cases a certain, though not serious, degree of derangement of nutrition is present in these cases.

Treatment of Chronic Poisoning.—Prophylaxis is most important. When the salts of silver are indicated as a treatment to be much prolonged, occasional discontinuance of the remedy is imperative. At the end of the third week of treatment, the remedy should be stopped for one week; after three months

a long intermission should follow. E. Harnack (*Arzneimittellehre*, 410, '83) asserts that in every recorded case of argyria at least one ounce of the salt had been taken. In the intermissions of treatment by silver salts, the patient should receive a thorough course of purgatives, diuretics, and baths. Iodide of potassium may be given with the silver salts to expedite its elimination (Foster).

Greater or less success has been claimed for various treatments in argyria, but in general they are futile (H. C. Wood). Rogers claims that blistering will lighten the color. Eichmann recommends the use of potash baths and of soap baths, each four times a week. The internal use of potassium iodide may produce some change in the color of the skin, but perfect restoration to the normal is generally beyond a reasonable probability.

Therapeutics.—The silver salts are given internally for the relief of gastrointestinal and nervous disorders. The nitrate is most generally employed. It should be given in gastric disorders, in pill form, one-half to an hour before eating, that the stomach may be properly exposed to the medicament. In intestinal disorders the pills should be coated with keratin, salol, or other substance not acted upon in the stomach.

GASTRO-INTESTINAL DISORDERS.—Nitrate of silver has been found of great value in the treatment of gastric ulcer, especially when combined, in pill form, with extract of hyoscyamus or opium.

Pyrosis is generally relieved by 1-grain doses of the oxide, given in pill form, a half-hour before meals. In dyspepsia, with yeasty vomiting, H. C. Wood has found that the use of the nitrate internally has given him the best results.

In chronic gastritis and gastric catarrh, when sour eructation or vomiting occurs

after meals, the nitrate in doses of $\frac{1}{6}$ to $\frac{1}{4}$ grain, given an hour before meals, will yield good results. Forlanini, in these cases, irrigates the stomach with a solution of silver nitrate, following it immediately by irrigation with a solution of sodium chloride.

Catarrhal jaundice has been relieved by $\frac{1}{12}$ -grain doses of the nitrate. Bartholow advises the use of the nitrate in nervous dyspepsia, cholera infantum, and catarrhal jaundice.

In intestinal ulceration Pepper advised the use of the nitrate in keratin-coated pills.

In ulceration of the cæcum or rectum and in acute and chronic dysentery, rectal or colonic injections of nitrate of silver are very valuable. If the cæcum be involved a large bulk must be used to reach the seat of the trouble; if the rectum is the part affected not more than 4 ounces should be used. In either case the bowel should receive injections of warm water, that the contents may be removed, and the mucous membrane cleansed and prepared for the medication. If cæcal, use 1 drachm of silver nitrate to 3 pints of water; if rectal, use 3 grains to 4 ounces. If the latter is chronic and very obstinate, the strength may be increased to 5 grains of the salt to 4 ounces of water. A solution of common table-salt should be at hand ready for use, and should be injected if the action of the silver is too severe, or to stop the action of the remedy when the desired effect is produced.

In typhoid fever Pepper highly recommended the use of the nitrate of silver ($\frac{1}{6}$ to $\frac{1}{4}$ grain, in pill) throughout the course of the disease. He believed that it modified the severity of the disease.

The oxide of silver has been used as an alterative in doses of 1 grain, given three or four times daily.

NERVOUS DISORDERS.—Silver is claimed to be the only remedy of any use in the treatment of anterior and posterior spinal sclerosis, and it has not always yielded success; the nitrate in $\frac{1}{4}$ -grain doses or 1 grain of the oxide may be given three or four times daily.

In epilepsy and chorea silver has been largely used, but it seems to do little good in most cases. Murray (Lancet, Sept. 21, '95), however, reports good effects and some cures from its use.

In locomotor ataxia Curci claims good results from the use of the double salt: sodium and silver hyposulphite. He gives daily from $\frac{3}{4}$ to 3 grains by mouth or from $\frac{1}{6}$ to $\frac{3}{4}$ grain hypodermically. He claims that it does not stain the skin (argyria).

EXTERNAL USES OF SILVER.—Silver nitrate has a wide range of usefulness in its external applications. It is employed as an escharotic, irritant, stimulant, alterative, astringent, and antiseptic.

SURGICAL DISORDERS.—The solid stick, or lunar caustic, has been found useful in stopping hæmorrhage from leech-bites. Fissures of the lips, tongue, nipples, rectum, and mucous patches and ulcers of the mouth yield kindly to applications of a 60-grain solution applied carefully on a pledget of cotton or by means of a camel's-hair pencil. In some cases the solid stick does better.

Boils and felons may be aborted by an early application of a strong solution of silver nitrate.

Ulcers and suppurating wounds are benefited by applications of silver nitrate. The surface of indolent ulcers may be touched lightly with the solid stick, or a line may be traced within and parallel to the margin of the ulcer every day or two, the ulcer being strapped with diachylon adhesive plaster during the intervals and the limb dressed with a roller

bandage. The healing of suppurating ulcers and wounds, with large flabby granulations, is hastened by an application, every day or two, of the solid stick or strong solution. Indolent sinuses from buboes or from abscesses may be stimulated to healing with a strong solution or the solid stick.

Bed-sores may be aborted if, as soon as the surface reddens, it is brushed over with a solution (20 grains to the ounce) of silver nitrate. This treatment is of no avail in paralytics.

Lymphangitis of the forearm resulting from a poisoned wound of the finger may be cured by applying the solid stick over the lines of inflammation.

Spasmodic œsophageal stricture has been relieved by the use of a sponge probang saturated with a very weak solution of silver nitrate.

PHARYNGEAL AND LARYNGEAL DISORDERS.—Inflammations of the pharynx, larynx, and fauces are amenable to applications of silver nitrate in varying strengths. An attack of acute pharyngitis may be aborted by the early application of a 60-grain solution. In laryngitis the parts should be cleansed with an alkaline solution, the parts anæsthetized by a solution of cocaine, and by the aid of a brush and mirror a 10- or 20-grain solution applied to the larynx.

In laryngeal phthisis a spray from an atomizer in the strength of $\frac{1}{2}$ to 2 grains to the ounce may do good service. Incidentally we note that Crocq, of Brussels, claims that silver nitrate is a valuable remedy in phthisis, promoting appetite and digestion and diminishing cough, expectoration, and night-sweats. He administers from $\frac{1}{7}$ to $\frac{1}{3}$ grain daily, in divided doses. It may, with advantage, be given in $\frac{1}{6}$ -grain dose combined with 3 grains of Dover's powder, as originally suggested by P. A. Brady.

In pertussis Ringer advises the use of a spray of silver-nitrate solution ($\frac{1}{2}$ to 2 grains to 1 ounce) to relieve the violence of the cough and give the patient a good night's rest. The spray should be used when the stomach is empty, as it may bring on retching. The nozzle of the atomizer should be placed well within the mouth to prevent staining of the skin.

OPHTHALMIC DISORDERS.—Silver nitrate is found useful in ophthalmological practice in all strengths from a 1-grain solution to the solid stick.

In simple conjunctivitis, where the discharge is profuse, a 2- to 5-grain solution will be found useful.

In purulent or gonorrhœal ophthalmia, when the discharge is profuse, the lids should be everted and wiped dry, and brushed with a 10- to 20-grain solution of silver nitrate, immediately neutralized with a solution of common salt. This should be done once daily.

Granular lids and trachoma are benefited by silver nitrate; if there is slight discharge the stick will be found beneficial; if there be much discharge the use of a 10-grain solution, with neutralization of excess, once daily will be followed by improvement.

In diphtheritic conjunctivitis, after the absorption of the membrane and the re-establishment of the discharge, use cautiously nitrate-of-silver solution as in purulent ophthalmia.

Credé has urged the use of a 1- or 2-per-cent. solution, 1 drop in each eye, in the eyes of all newborn infants to prevent the occurrence of ophthalmia neonatorum. We believe the treatment should be restricted to those cases in which the mother is suffering from some ichorous leucorrhœal discharge. It is not to be commended as a routine procedure.

The use of silver should be interdicted

where corneal ulceration exists, and when continued use of a remedy is desired. The danger of permanently staining the tissues must not be forgotten.

CUTANEOUS DISORDERS.—It is claimed that pitting in small-pox may be prevented by puncturing the vesicles, on the fourth or fifth day, with a needle dipped into a 4-per-cent. solution of nitrate of silver. Others paint the skin with a 1- or 2-per-cent. solution, and claim that it is equally effective. Shoemaker suggests the use of the mitigated stick.

John Higginbottom urges the use of silver-nitrate solution (160 grains to the ounce) in the treatment of erysipelas. The part is well washed with soap and water, then with pure water, and finally wiped dry with a soft towel. The solution is then to be applied two or three times on the inflamed surface and beyond it, on the healthy skin, to the extent of two or three inches. Others suggest outlining the affected patch with a broad line to limit the spread of the disease.

Nitrate of silver is used to destroy parasitic fungi, to cause exfoliation, or for a stimulant effect. As a caustic it is inferior to several other caustics. It has been found useful in some forms of eczema (chronic forms and circumscribed patches) and in relieving the itching of prurigo and lichen. Pruritus pudendi vel ani et vulvæ may be benefited by a 4- or 6-grain solution painted upon the parts two to four times daily.

The use of silver nitrate has been recommended in lupus, psoriasis, erythema, and ringworm.

VENEREAL DISORDERS.—In the treatment of buboes Cordier reports excellent results from injections of a 2-per-cent. solution of silver nitrate in the early stage.

In orchitis and epididymitis a strong solution of the nitrate painted over the

scrotum, in the early stages, will often relieve the pain and swelling.

Injections of nitrate-of-silver solutions are most useful in the later subacute stages, in the strength of $\frac{1}{2}$ grain to 3 ounces. Strong solutions used early have been advised for the purpose of aborting the disease; such use is not to be commended or indorsed.

GYNÆCOLOGY.—In uterine ulceration and in those cases of leucorrhœa where the cervix is boggy and tender, great benefit follows the application of the solid stick within the cervix uteri. This use is often followed by headache about the vertex, and this is, in turn, relieved by 10-grain doses of the bromides. Nitrate-of-silver solutions were used very extensively for erosions of the cervix, but other remedies have supplanted them. Vomiting of pregnancy is often relieved by brushing the cervix over with a 60-grain solution of the nitrate.

REMOVAL OF STAINS.—Several methods of removing silver stains from clothing: The stain may be washed with a solution containing $2\frac{1}{2}$ drachms of potassium cyanide, 15 grains of iodine, and 3 ounces of water. Another method is to dissolve 15 grains of corrosive sublimate in 7 ounces of boiled water, and add about 45 grains of sodium chloride (table-salt) just before using; lay the stained materials in it for about five minutes and then wash them two or three times. Hahn advises the use of a solution containing 75 grains each of corrosive sublimate and of ammonium chloride dissolved in 10 drachms of water.

When the stains are older rub them with a mixture of iodine and ammonia, and while the part is still wet wash it thoroughly. This mixture, when dry, forms a highly explosive mixture.

Cyanide of potash will generally remove stains from the fingers or skin.

The part should be well rinsed immediately afterward.

Unofficial Silver Salts and Compounds.

ARGENTAMIN is an 8-per-cent. solution of silver phosphate in 15-per-cent. aqueous solution of ethylene-diamine. It occurs as a colorless, alkaline liquid, miscible with water. It coagulates albumin but slightly. It is used externally, as an antiseptic and astringent, instead of silver nitrate or corrosive sublimate. It is also used by injection (1-10,000 to 1-4000) in gonorrhœa.

ARGONIN. — A soluble silver-albumin salt produced by the union of sodium-casein, silver nitrate, and alcohol. It occurs as a fine white powder, soluble in hot water. It is a non-irritant antiseptic, like argentamin. It does not coagulate albumin of the tissues, and is said to be antidotal to the gonococcus. In the conjunctival sac it is no more irritating than water, but is said to yield good results in purulent and catarrhal conjunctivitis. It does not stain the clothing.

Literature of '97-'98-'99.

The following advantages are claimed for protargol and argonin over the older silver salts in treating the purulent ophthalmia of children: (1) quick destruction of the gonococcus, (2) the earlier disappearance of the secretion and of the inflammatory process, and (3) the more prompt restoration of the injured cornea and other tissues to the normal.

Protargol is more powerful than argonin, and should not be used in greater strength than from $\frac{1}{2}$ to 2 per cent. Peck (*Pediatrics*, vol. vii, p. 129, '99).

LARGIN. — Largin is a grayish-white powder, very light; soluble in water, glycerin, blood-serum, albumin, alkali and acid albumins, and in solutions of peptone. It contains 11.1 per cent. of metallic silver.

It is of especial value as an antigonorrhœal remedy.

Literature of '97-'98-'99.

Sixty cases of gonorrhœa have been personally treated with largin, but in only 41 of these were the patients under constant supervision. Of this number, 35 were of acute anterior urethritis; and of these, 27 were cured without any symptoms of posterior urethritis occurring. In 8 cases this did occur. The mode of employment used was to inject solutions varying in strength from $\frac{1}{4}$ to $1\frac{1}{2}$ per cent., according to the stage of the gonorrhœa. The injections were practiced thrice daily, the fluid being retained in the urethra for from 5 to 10 minutes, morning and noon, and for from 15 to 30 minutes in the evening. Largin was found, however, not to abort a gonorrhœa; it possesses the power to reduce the period of the disease to a minimum, when employed immediately after infection. It was also found to give good results in subacute posterior urethritis of gonorrhœal origin, when employed for some weeks, or even months, in the form of a 0.5- to 5-per-cent. solution. C. Pezoli (*Wien. klin. Woch.*, xi, p. 286, '98).

Largin is personally used in blennorrhœa in the form of 0.25- to 2-per-cent. solutions, which are injected three times daily, being retained for ten minutes each time. In very acute cases the treatment affords most excellent results, a cure being effected in from five to six weeks. In the subacute cases, accompanied by profuse discharge, the remedy is not so effective. G. Nobl (*Centralb. f. d. ges. Ther.*, xvii, p. 385, '99).

PROTARGOL.—Protargol is a proteid compound of silver introduced by Neisser in 1897. It occurs as a light-yellow powder, differing from argonin in that it is freely soluble in water up to 50 per cent., forming a clear, light-brown solution. It contains 8.3 per cent. of nitrate of silver, whereas in argonin the proportion is 4.1 per cent. and in argentamin only 2.0 per cent. Its non-precipitation by solutions of albumin and chloride of

sodium make it especially valuable in the treatment of gonorrhœa, and its neutral reaction renders it unirritating to the mucous membranes. It is used principally as an injection in gonorrhœa in solutions of $\frac{1}{4}$ (early stage) to 1 per cent. (later stages).

Fürst, of Berlin, has used a 10-per-cent. solution in ophthalmia neonatorum, and prefers it to silver nitrate. In acute conjunctivitis a 2-per-cent. solution is most satisfactory, although the strength may be increased to 10 per cent.

SILVER ARSENITE occurs as a yellow precipitate which may be decomposed with heat. It is used in skin diseases as an alterative and antiseptic. Dose, $\frac{1}{100}$ to $\frac{1}{60}$ grain.

SILVER CHLORIDE occurs as a white powder which blackens upon exposure to the light. Soluble in ammonia, potassium thiosulphate, and potassium cyanide. It is an antiseptic and nervous sedative. Used in gastralgia, diarrhœa, pertussis, chorea, epilepsy, and various neuroses. Dose, $\frac{1}{3}$ to $1\frac{1}{2}$ grains.

SILVER CITRATE occurs in white powder or needles, soluble in water. It is an antiseptic, and has been used as a dressing for wounds and for inflammation of the various mucous membranes. In acute gonorrhœa a solution of 1 to 8000, gradually strengthened, is advised.

SILVER LACTATE occurs in small, silky needles, soluble in hot water and in 20 parts of cold water. It is an antiseptic. For gargles and mouth-washes, solutions of from 1-4000 to 1-8000 are used. It will stain the skin.

Actol (silver lactate) is an exceedingly good antiseptic within the animal body, excelling corrosive sublimate. It, however, coagulates albumin, and thus cannot be used as a dusting-powder for wounds. Itrol (silver citrate) is also a good antiseptic, and can be dusted on a

wound very thinly, but not daily. It may also be used for washing out cavities. Itrol dissolves in distilled water, 1 in 4000; and if a stronger solution is required actol should be used. *Credé* (*Archiv f. klin. Chir.* B. 55, H. 4, '96).

SILVER AND POTASSIUM CYANIDE occurs as white crystals, permanent in the light, and soluble in 4 parts of water. It is bactericidal and antiseptic. One part in 50,000 destroys anthrax bacilli. It is incompatible with acids and is very poisonous.

UNGUENTUM CREDE. — Unguentum *Credé* is a salve containing 15 per cent. of soluble metallic silver. The greatest care is needed in its preparation, in order to obtain the minute subdivision of the silver particles necessary for its absorption through the skin.

It is indicated in the treatment of acute suppurative processes, and should be thoroughly rubbed into the cleansed skin until it has approximately disappeared. This takes from twenty to thirty minutes. The amount to be used varies from 30 to 45 grains at each inunction.

Literature of '97-'98-'99.

The formula of unguentum *Credé* is as follows: 15 per cent. of soluble silver is incorporated in lard by the same method as is the mercury in gray ointment, and to the product 10 per cent. of wax is added. The ointment is flavored with benzoinated ether. From twenty to thirty minutes are required for inunction. This ointment is useful in acute suppurative processes, as phlegmon, lymphangiectasis and lymphadenitis, septicæmia, commencing osteomyelitis, phlegmonous angina, furunculosis, erysipelas, puerperal fever, and gonorrhœal and articular rheumatism. In general sepsis, or when inunctions are not practicable, it may be given internally as a pill: soluble silver, $\frac{1}{6}$ grain; sugar of milk, $1\frac{1}{2}$ grains; glycerin, $1\frac{1}{2}$ minims, with sufficient water. Two of these may be administered twice or thrice daily, fol-

lowed by from 3 to 6 ounces of boiled water or tea.

Pencils of 3 grains each are useful for fistula. In solution, 1 or 2 to 10,000, it may be used for irrigation. Of the strength of 1 to 500-2000, in severe sepsis it can be administered intravenously after the method employed by Baccelli for mercurial solutions. B. Cr   (Klin. ther. Woch., Nos. 14, 15, '98).

Personal experiences with soluble metallic silver in the treatment of the septic infection of wounds are summed up as follows:—

1. In soluble metallic silver we possess a valuable remedy for the successful treatment of blood poisoning caused by septic infection, when the diagnosis is made correctly, and while secondary affections are still absent.

2. The method of the intense silver-therapy is suitable for both acute and chronic sepsis and for furunculosis.

3. It is most energetically exhibited by means of inunctions, with the unguentum Cr  , in which, by cutaneous absorption, the medicament is directly introduced into the circulation.

In the blood the formation of the powerfully bactericidal silver salts effects a general antiseptis and a disinfection of the entire organism. Oscar Werler (Deut. med. Woch., Oct. 6, '98).

Cr  's silver ointment has been found valuable in puerperal sepsis. This ointment is used once in twenty-four to thirty-six hours in acute cases and in chronic cases twice daily. It is rubbed into the body at some distance from the point of infection, and should be thoroughly carried into the skin and subjacent tissues. Results of the treatment are immediate improvement in the symptoms, beginning within from three to ten hours. In a personal case of septic absorption when the patient's condition was critical, between 1 and 2 drachms of Cr  's silver ointment were rubbed into the inner surface of the thigh, and repeated on the following morning. A rapid and marked improvement followed, the patient's temperature falling to normal and her pulse gradually improving. Five days afterward there was again fever and rapid pulse, when two inunc-

tions were given twelve hours apart. After this inunctions were given daily in small quantity for four days, and then at intervals. Altogether about 1¼ ounces of the ointment were employed. Patient made a good recovery. Jones (Obstetrics, No. 2, '99).

SINUSES, DISEASES OF.

Ethmoiditis.

Definition.—This term is used by some authors to designate inflammation of the middle turbinated body in connection with ordinary chronic rhinitis, while others appear to restrict its use to inflammation beginning within the ethmoidal labyrinth. It is evident that two processes, perhaps radically different, are concerned here, each of which has been associated with the term ethmoiditis. In the first place, in chronic rhinitis, under some circumstances, the inflammation of the mucosa of the middle turbinated bone extends by contiguity to the subjacent bone, producing a sort of fungous osteitis, with more or less suppuration, dry caries, or osseous hypertrophy; further extension by continuity involves the ethmoidal cells; so that there is increased production of granulation-tissue and pus, which latter may become pent up. This process, thoroughly ingrafted upon the ethmoid, may play a very prominent part in settling up antral or frontal-sinus disease, and also in the formation of mucus polypi. The other conception of ethmoiditis has reference to the endogenous production of suppuration, such as occurs in all the other sinuses. Here we understand that the process starts from within the labyrinth, through invasion of the labyrinth during a special rhinitis, or influenza, etc.; the accidental presence of pyogenic germs in the labyrinth roused to activity by repeated attacks of severe coryza, and, finally infection of the labyrinth by pus

from one of the other sinuses. The process once established within the sinus, it may readily extend through its wall and attack the middle turbinated bone.

While both varieties of etiological factors are competent to cause ethmoiditis, the fact that suppuration of the ethmoidal cells is much more common than suppuration of any of the other sinuses would seem to prove that its great frequency here is due to the fact that the ethmoidal cells are particularly liable to inflammatory action because of their relation to the middle turbinated bone.

Symptoms.—The superficial form of ethmoiditis is simply one of the phenomena of chronic hypertrophic rhinitis with enlargement of the middle turbinate body. The symptoms of this affection belong, therefore, to chronic rhinitis, and also, in part, to intranasal mucous polypi. As far as the affection is a purulent one, the symptoms consist of a unilateral purulent discharge, or in some cases of the escape of a large quantity of pus after removing some portion of the middle turbinated body.

In cases of suppuration of any of the sinuses acute exacerbations are common; so that such symptoms as tenderness, localized pain; neuralgias of the cheek, eye, and forehead; nasal obstruction, together with unilateral discharge of pus, will at once call the attention of the observer to the probability of sinous suppuration. It remains to determine from which cavity the pus emanates. But, since it is true that very frequently two or more of the sinuses on the same side are involved, it will readily be seen how difficult such a task is. It is of very little value to note the exact point through which the pus enters the nostril, in determining which sinus is affected, because the middle turbinated blocks

the middle meatus in so many different ways that pus may easily appear to emanate from the antrum when actually it flows down from the ethmoidal cells,—and the reverse is also true. Of much more importance in diagnosing an ethmoiditis is it to note whether the middle turbinated bone is enlarged and congested; and whether fungoid granulations or polypi have developed. We should not expect that a suppurating process of the ethmoidal cells be present if the middle turbinated bone is normal in appearance.

As regards the co-existence of ethmoidal and antral suppuration, we believe that involvement of the ethmoidal cells is by far the most common of sinus suppurations, and that, very frequently, the test of transillumination shows the antrum to be the seat of empyema when this cavity is only a receptacle for the pus which flows down over the outer wall from the ethmoidal cells above. This test is useful not only in diagnosing antral disease, but the electric light in the mouth frequently presents a shadow on the side of the nose where there is a suppurating ethmoiditis, or where the middle turbinated bone is largely hypertrophied.

Etiology.—If the outward origin is the correct view, the cause of ethmoiditis is simply a chronic rhinitis attacking the middle turbinated body; it is a complication or sequel of chronic rhinitis just as is the tumor-like hypertrophy of the posterior end of the lower turbinate body. Wright believes that pus from the frontal or maxillary sinus flowing over the mucosa of the ethmoid region may set up suppurative ethmoiditis from without, accompanied by that cedematous condition which precedes the formation of mucous polypi. The weight of analogy would seem to require that

suppurative processes should begin within the ethmoidal labyrinth; but clinical evidence appears to show that superficial ethmoiditis is much more common than the deeper form, which involves the labyrinth (Wright). A compromise view is furnished by Grünwald, who disputes the claim that intranasal pus (when not due to ulceration) must have been formed in a sinus, by stating that pus is readily formed behind any obstruction in the middle meatus. The most satisfactory view, therefore, is that hypertrophy of the middle turbinated body is not necessarily due to purulent inflammation, but that it favors the formation of pus by causing stagnation of the secretions. As far as we know, there is no direct proof that the fungoid granulations and polypi, the bone-cysts, dry caries, etc., are of pyogenic origin. To sum up, suppurative ethmoiditis is a term which may embrace two different processes. In ordinary hypertrophy of the middle turbinate, polypus formation, etc., pus readily forms as a result of stagnation of secretions from obstruction; while exceptionally suppuration arises from within the labyrinth just as it may within the sphenoid or other sinuses. In the first case—so-called superficial ethmoiditis—the exact part played by the pus is obscure. In the second case (deep ethmoiditis) there is no doubt whatever that the affection is primarily purulent and that the pus is responsible for all the phenomena.

Treatment.—The treatment of ethmoidal suppuration will, from what has already been said, naturally necessitate the cure of the chronic rhinitis which may be present. Careful study will show why inflammation of the ethmoidal cells has occurred on one side of the nose rather than the other. Deviations of the septum, spurs on the septal partition,

or a long-continued hypertrophy of the inferior turbinated body, each producing general congestion, causes an interference with the nasal respiration, circulation, and drainage. These are all competent to cause inflammation and hypertrophy of the middle turbinated bone, and their evil effects should be corrected by removing them with saw, scissors, galvanocautery, and chromic acid. Cauterizing sensitive areas in patients constantly predisposed to acute coryzas is also of use in preventing extension of inflammation to deeper parts. Acute suppuration of the ethmoidal cells, unless a chronic empyema of some other sinus is present, may be prevented from becoming chronic unless there is already radical change in the middle turbinated.

Treatment of ethmoiditis includes the removal of mucous polypi and the reduction of the general fungoid granulations which cover the anterior, internal, and posterior face of the middle turbinated. This tissue is most easily removed with nasal scissors and with cutting forceps. The galvanocautery is not a useful instrument in this location. After projecting tissue has been removed by cutting, it can still further be reduced in size by one or two applications of chromic acid. Such preliminary work as this will frequently so improve the condition of the middle turbinated as to cure the suppurating surface in the ethmoidal labyrinth. But there are many cases that will require more radical treatment; that is, removal of the anterior and external portion of the middle turbinated bone with the cold snare or crushing forceps, so that the ethmoidal cells may be reached, more perfect drainage established, and necrosed bone removed by careful curetting. Once this operation is commenced, great care

should be used to secure drainage from above downward in order to prevent sepsis and possible dangerous inflammation of the meninges or of the orbit. It will require the best of judgment to determine when nasal irrigation should give place to the soothing effects of oily sprays or quieting powders. When the antral cavity is filled with pus derived from the ethmoidal cells, that, too, should be drained by an opening through its floor or its internal wall.

Inflammation of the Sphenoidal Sinus.

This affection, while not uncommonly recognized post-mortem, is indefinite as to symptomatology during life, although now and then individual instances of correct diagnosis occur.

Symptoms.—Suppuration of this sinus is often suspected in protracted suppuration from the nose when other causes can be excluded. Some of the more radical rhinologists have advocated the removal of the turbinated bodies in cases of this sort, so that the region of the sphenoidal and posterior ethmoidal sinuses may be brought within the range of ocular inspection and of free use of the probe and curette.

It is very unlikely that these sinuses are ever the seat of an isolated suppurative process. We would naturally expect to find more or less disease of the nasal fossæ and other sinuses. In free suppuration from these sinuses the pus is naturally discharged into the naso-pharynx. In sphenoidal abscess the retention of pus may cause intracranial and ocular symptoms. The most significant symptom, however, would seem to be pus flowing down the posterior wall of the pharynx, which can be traced up to and over the body of the sphenoid into the posterior nasal cavity.

Treatment.—No one would advise

curetting in a location so dangerously near the brain, but it is possible that a probe could be carried through the anterior nares behind and above the middle turbinated against the anterior face of the sphenoidal sinus, and in this way carious bone might be appreciated, drainage improved, and the cavity suitably washed.

Inflammation of the Frontal Sinus.

While authors describe acute catarrhal and acute purulent inflammation of these cavities, such affections are as yet insignificant from a clinical stand-point, unless a frontal abscess should chance to form from obstruction of the outlet of the sinus. We shall, therefore, restrict our observations to the subject of purulent inflammation, either free or latent.

Symptoms.—The symptomatology of free suppuration of the frontal sinus is unsatisfactory and the diagnosis is usually made by the exclusion of ethmoid and antral suppuration—no easy task, especially as the two latter sinuses may themselves be suppurating. The pus in some cases drains away continuously, while in others it seems to collect slowly and produce local symptoms of pain, tenderness, aprosexia, etc. Under the latter circumstances the pus, after filling the sinus, may escape *en masse*, with marked relief of symptoms. When the exit is completely obstructed, as it may be from polypi, etc., a frontal abscess forms, recognition of which is comparatively easy.

Etiology.—The cause of suppuration of the frontal sinus is largely a matter of conjecture. Doubtless, such attacks often follow a severe coryza; but, as this affection is not believed to be due to pyogenic bacteria, the connection between the two is not apparent. Influenza appears to be able to provoke the disease in many instances; but, in all

cases in which suppuration of this sinus follows a severe coryza or influenza, the predisposition must be no inconsiderable factor. If a few pyogenic cocci were present in the sinus, repeated attacks of simple inflammation or perhaps a single intense attack might be sufficient to develop the virulence of the germ and produce suppuration; or in case of any serious intranasal affection involving the middle meatus such as hypertrophic rhinitis, polypi, ethmoidal or antral disease, if a pyogenic factor were present, infection could readily travel along the infundibular passage into the frontal sinus. Summing up, there appear to be three modes of possible infection: I. Repeated attacks of severe coryza, such as occur in a nose with marked septal anomaly, may rouse local pyogenic micro-organisms to activity. II. In the course of severe infectious diseases, such as scarlatina or influenza, the specific germ of the disease may establish a purulent focus in the sinus. III. If there is present anywhere in the nose or other sinuses a chronic suppurative process, especially in the neighborhood of the middle meatus, the infection might be propagated to the frontal sinus.

Treatment.—Since suppurative inflammation of the frontal sinus occurs almost always by direct extension from the nasal passages upward, it may reasonably be expected that when such abnormalities as polypi, deflected septa, suppurating ethmoiditis, antral disease, and any form of chronic rhinitis,—when all these have been corrected,—the frontal sinus will rapidly return to its normal condition without further treatment than the necessary cleansing. Unnecessary probing of the frontal region is injurious rather than beneficial. After proper surgical work has been performed to correct the nasal disease which has done the harm,

sedative applications of suitable oils and quieting powders will do more to allay inflammation in the frontal sinus than will efforts to make high applications, astringent and cauterizing in character. The cases are very few which will require external operation to relieve retained pus. In two such cases seen by the writer a discharge through the natural opening was accomplished by hot fomentations, the patients being placed in a Turkish bath. Sprays of weak solutions of cocaine may be sufficient to free the passages into the frontal sinus.

Inflammation of the Antrum.

As in the case of the frontal sinus, the clinical pathology of this cavity consists principally of suppuration, either free or retained. Free suppuration causes intranasal symptoms, and this form is most frequently seen by the rhinologist. In suppuration with retention of pus from obstruction of the ostium maxillare, if the case is not already under the care of a rhinologist, a surgeon is usually consulted. Finally, there is a special form of maxillary suppuration occurring in connection with dental caries which is usually cared for by the dentist. The result of this clinical subdivision is a partition of the literature of the subject, and somewhat contradictory accounts of the causes, symptoms, etc., of this affection. Most rhinologists see but little of that form of suppuration caused by alveolar caries.

Symptoms.—A discharge of pus from the antrum flowing through the nasal passages produces sufficient irritation to cause localized congestion and swelling of the entire mucous surface; so that nasal obstruction is caused not only by the pus itself, but by the general swelling of the mucous membrane. The purulent discharge varies in color and thickness. During an acute exacerbation the

discharge will be thin and perfectly yellow; when the symptoms subside, the pus becomes somewhat mixed with mucus, and so is thicker and less highly colored. Unlike mucus or thin mucopurulent secretion, a discharge of pus from the sinuses glues the handkerchief together. The discharge has little of the fœtid odor noticed in a severe case of ozæna, but the odor is so peculiar as hardly to be likened to anything else. The olfactory sense of the patient is not much blunted; so that he notices the odor more than does the patient suffering from different forms of caries of the nasal passages.

Diagnosis.—A unilateral discharge of pus from a nostril immediately suggests ethmoidal or antral suppuration, or both. Since, in our opinion, ethmoidal suppuration is the more common form of the two, it will be well to exclude this affection before deciding that the pus originates in the antrum. As has been said, it is not enough to find by transillumination that a maxillary sinus is filled with pus to conclude even then that this is the primary trouble. We may, perhaps, exclude ethmoidal suppuration by noting that there is no special abnormality of the middle turbinated bone, no fungoid granulation or polypi, and that the probe cannot reach carious bone in the region of the middle meatus or ethmoidal cells. The fact that the pus enters the nostril from above or below the middle turbinated bone is not specially significant. A history of dental trouble, the location of pain about the cheek rather than over the supra-orbital ridge, will point to antral suppuration rather than to ethmoidal trouble. Another difference between the discharge from the antrum and that from the ethmoidal cells is that, while in the latter the flow is quite constant, in the former

pus is present in the nostrils when there is overflow or when the head is bent forward or carried to the side. The discharge is more or less intermittent. The symptoms of pus confined in the antrum are much more positive, and are those of pressure and distension of the sinus and cheek. Sometimes the enlargement of the face on the affected side is very noticeable. There are cases where pus has been found by an exploratory needle passed through the middle meatus into the antrum in which the test of the electric light gave no symptoms.

Etiology.—The pyogenic bacteria which cause antral suppuration may be accidentally present; repeated attacks of severe coryza, such as occur when obstructive deformities are present, may, then, by extending into the sinus, rouse them to activity. In the severe types of infectious disease—such as scarlatina, measles, whooping-cough, and influenza—these specific germs may gain entrance into the antrum by extension along the mucosa, and incite an acute suppuration, which may persist as a purulent focus. Another frequent mode of origin would seem to be the following: Whenever pus is present in the middle meatus from any cause, and especially in connection with suppuration of the ethmoidal sinuses, it can readily drain into and infect the antrum. Extension of suppuration from the roots of carious teeth, as well as trauma of all sorts, disease of the superior maxillary bone, etc., also cause suppuration of the sinus.

While theoretically these would seem to be the reasonable causes of antral disease, yet the relation of antral suppuration to pre-existing nasal disease is less apparent and direct than is ethmoidal suppuration to middle-turbinated inflammation. We can hardly realize a severe middle-turbinated affection which

might not eventually involve the ethmoidal labyrinth. But in the case of the maxillary sinus, while theoretically it is easy to understand the extension of inflammation from the middle meatus through the maxillary opening, yet the antrum seems anatomically to be a cavity more isolated and consequently not sharing so intimately in nasal inflammations as do the ethmoidal cells. We can also understand that a rhinitis excited by a specific bacillus, as in the intense coryzas of an eruptive disease, may involve the antrum; but our experience would seem to confirm the belief that, where suppuration of the antrum exists alone or precedes the suppuration of any other sinus, it originates quite as often from caries of the teeth or disease of the superior maxilla as from the ordinary forms of rhinitis. There are a large number of cases of empyema of the antrum which are clearly secondary to ethmoidal suppuration, in which case the antrum is filled with the pus, which runs down from the ethmoidal cells over the outer wall. Transillumination often shows the maxillary sinus clouded when there have been no acute symptoms about the cheek which would indicate active inflammation.

Many authors speak of diseases of the middle meatus as competent factors, but such affections are vague and are seldom appreciated except as associated with suppurative ethmoiditis and polypi. The most common source of pus in the antrum is, first, from the ethmoidal cells above; second, the form of suppurative inflammation caused by carious teeth; and, last, a secondary involvement of the antrum from especially severe forms of rhinitis.

Treatment.—The antral cavity must necessarily be drained of pus and thoroughly disinfected whether it be the primary seat of trouble or secondarily

involved. When it is simply the receptacle of pus from other sources, washing alone with suitable disinfecting solutions—such as a 10-per-cent. solution of boroformalin or borolyptol, 1 to 10,000 mercuric bichloride, Seiler's or Dobell's solution, 10-per-cent. solution of peroxide of hydrogen—will be sufficient for the treatment of this cavity while other forms of intranasal disease are being remedied. But when there is a suppurating focus in the antrum itself, and the lining walls of the cavity have degenerated into fungoid granulations and polypi, it will be necessary to make the opening into the antrum so large that a curette can be used and that suitable dressings can be employed. If the teeth are perfectly good on the affected side and the pus in the antrum is from other sources, then it may be sufficient to make the opening into the antrum through the middle meatus. The cavity may be washed out by means of a small tipped syringe, or a small-sized Eustachian catheter. But where degenerative changes have taken place in the antrum, and especially where there is evidence of dental disease, an opening made by trephining through the alveolar process will be much more satisfactory. After such an opening has been made the patient may be sent to the dental surgeon, who fits a suitable metal tube into the opening long enough to extend from the alveolar process above the floor of the antrum, so as to avoid clogging of the inner opening. This tube is held in position by a clasp about the nearest tooth. Disinfecting washes should be employed several times a day in the beginning, but later the strength of the solution should be diminished and they should be employed less frequently until the cessation of the pus through the tube will allow the intermission of all washes.

Sometimes after long washing such powders as bismuth, boric acid, aristol, and alum—a proper combination of all of them—will aid materially in restoring the lining of the antrum to a normal condition. Extensive curetting will sometimes be found necessary.

CLARENCE C. RICE,
New York.

SKIN-GRAFTING.—When skin-grafts are obtained from the patient himself, they are called autografts; when from another person, heterografts; and when from animals, zoögrafts. The best results are derived from autografts. Heterografts grow better than zoografts, but it must not be forgotten that they may cause disease, especially syphilis.

The Method of Reverdin.—With fresh wounds or healthy granulating surfaces little preparation is necessary. Ulcers should be clean and devoid of necrotic tissue; a good indication of fitness is the appearance of a pedicle of new skin around the edges. Desirable as asepsis undoubtedly is, in the majority of instances it cannot be obtained. It is sufficient that suppuration is not too profuse and infection not too virulent. If the circulation is impaired by surrounding cicatricial tissue or by varicosities, or if marked inflammatory changes are present, these conditions must be modified by incisions, moist compresses, rest in bed, etc. Pale, indolent, or exuberant granulations should be treated by cauterization, compression, etc. If strong antiseptics have been employed, they must be washed away before transplantation is begun.

The grafts, which are best obtained from the arm or thigh, should be about the size of a grain of wheat. They are cut by elevating a portion of skin with mouse-toothed forceps and dividing it

with scissors curved on the flat, removing the entire epithelium and a portion of the corium without disturbing the subcutaneous fat.

The bits of cuticle adhere to the surface to be grafted, especially if gentle pressure with a pledget of gauze be employed. Nothing is gained by scraping or in any way wounding the granulations. The transplantations should be close together, as the greatest size to which a graft can grow is perhaps that of a silver dime.

Immediately over the grafts may be placed strips of rubber protective; or, better, a single layer of gauze, which may be pinned around a limb or fastened at the edges with collodion. The latter method is simpler and permits freer exit of secretions.

Whether the external dressing is moist or dry is usually of little importance, but no powerful antiseptic should be used. As there is generally some suppuration, it is necessary to change the superficial portion of the dressing every twenty-four hours at least, leaving in place the rubber tissue, or the undermost layer of gauze, as the case may be. Gentle irrigation with a solution of salt or boric acid assists in maintaining cleanliness.

The Method of Thiersch.—There is no process of skin-grafting so simple, so reliable, and so generally applicable as this. Granulating surfaces or fresh wounds may be covered with epithelium in from ten days to three weeks; cicatricial contractions are avoided; and in many cases the cosmetic value can scarcely be overestimated. The process is of great value in the treatment of ulcers, burns, and defects following operations or injuries. The grafts will adhere to periosteum; to bone from which the external surface has been removed; to tendons, fascia, dura mater, muscle, etc.

The patient is anæsthetized, and if granulations are present it is best to scrape them away with a sharp spoon down to the comparatively firm tissue beneath, although this is not absolutely necessary. Oozing is checked by elevation and pressure, an Esmarch bandage being unnecessary. The grafts are cut with a razor from the anterior surface of the thigh. An assistant makes the skin tense by means of a hand on either side of the limb, while the operator, standing with his back toward the patient's feet, cuts toward himself, with his left hand stretching the tissues in the direction of the knee. With a backward and forward sawing motion it is not difficult to obtain shavings of epidermis an inch or more wide and several inches in length and as thin as paper, which is a desirable thickness. No appreciable scar results. The delicate strips fold up on the blade of the razor from which they may be spread directly upon the surface to be grafted, and so adjusted that they overlap each other and the edges of the skin, completely concealing the raw surface. Healing without suppuration is not uncommon. Next to the transplanted cuticle are placed strips of rubber tissue or a single layer of gauze, as described in the Reverdin method. If a moist dressing is employed, it should consist of a thick pad of gauze saturated with normal salt solution and covered with cotton and oiled silk. This should be removed often enough to keep it moist. A dry dressing answers equally well, applied as in the treatment of ordinary wounds.

The grafts do not become firmly fixed for nine or ten days, and it is well not to soak off the undermost layer of gauze for about two weeks.

The Method of Wolfe: Krause's Modification.—In this method grafts are em-

ployed which fill the entire defect, and which comprise the whole thickness of skin without including the subcutaneous tissue. In cutting the skin at least one-third must be allowed for shrinkage. Sutures are usually unnecessary and artificial heat is detrimental.

Wolfe's method has recently been modified and the technique improved by Krause, who employs spindle-shaped grafts so that the wound produced by their removal may be immediately closed. The strips of skin, cut into smaller pieces if desirable, are accurately fitted into the defect, which is to be closed. The operation must be a "dry" one, and the raw surfaces of the skin should be handled as little as possible.

The Method of Hirschberg.—Believing that grafts subsist upon their contained fluids until new vessels are formed, Hirschberg beats the skin with rubber tubing until it becomes engorged before making a transplantation. He employs the entire thickness of the cuticle, including the subcutaneous fat. Sutures are often required.

Anomalies in Grafting.—Transplantation of mucous membrane may be made. It may be shaved off as in skin-grafting, —for instance, from the lips,—or it may be stripped off in its entirety.

More or less satisfactory results can be obtained by the use of shavings of callus from the palms of the hands or soles of the feet or from sections of corns. "Epithelial rods" from warts have been successfully used, as have also flakes of old, dried epidermis from various parts of the body; even "epithelial dust" scraped from the surface of the skin will often grow on a granulating wound. Deeper scrapings, drawing sufficient blood to form a paste, are said to be quite satisfactory at times (Mangoldt).

Grafting from dead bodies or from

amputated limbs has frequently been resorted to, but the danger of carrying disease cannot be disregarded.

Sponge-grafting is now seldom employed. Very thin slices of sponge are sterilized by boiling, and placed upon the raw surface. The material acts as a frame-work only for the granulations, and is soon absorbed.

The idea of grafting from animals is attractive, but the results are too uncertain, and the method has largely fallen into disuse. Skin has been obtained from frogs (abdomen), chickens (beneath the wings), pigs, dogs, cats, rabbits, guinea-pigs, etc. Cocks' wattles, sections of the testicles of rabbits, and the lining membrane of eggs have also been employed.

Histology and Pathology.—The existence of epithelial grafts may be said to be, for a time, parasitic. In the course of about eighteen hours vascular connections begin to form, firm adherence taking place by the tenth day. Successful grafts soon become pinkish in color. New skin arising from large grafts which cover the entire raw surface becomes in time movable, but that produced from Reverdin-grafts remains immovable, owing to cicatricial tissue between the individual bits of cuticle.

Hairs may remain where transplantations of the entire thickness of the skin are made, but they are apt to become deformed or fall out.

But little contraction takes place in the Thiersch and Wolfe-Krause methods, but in the method of Reverdin contraction is apt to be considerable.

Exfoliation of epidermis may occur in any form of grafting, but this does not necessarily mean that the grafts are dead. A remarkable phenomenon in connection with Thiersch grafting is the readiness with which depressions fill up

to a level with the surrounding skin, especially about the face.

Comparison of Methods.—The simplest is that of Reverdin, although the new skin is often little better than scar-tissue. It should be reserved for cases where the rapid closure of a granulating surface is desired without reference to anything else.

It may sometimes be expedient to graft from dead bodies or from amputated limbs; and occasionally use may be found for "epidermal scrapings," or for epidermis obtained from warts, corns, callosities, blisters, etc.; but one must not expect the results to be brilliant.

Thiersch grafting has a wider range of applicability than any other method, and its results are quite uniformly good, both functionally and cosmetically; but it must give way to the Wolfe-Krause proceeding where thicker skin is desired which more closely resembles the surrounding integument.

It is seldom, if ever, desirable to employ the method of Hirschberg.

The skin of animals does not compare in vitality with that taken from a patient's own body or from some other person. It is seldom necessary to transplant from mucous membrane, as ordinary Thiersch grafting answers the same purpose in nearly all cases.

LEONARD FREEMAN,

Denver.

SODIUM.—Sodium, or natrium, is a light, soft, ductile, malleable metal, of silver-white lustre, when freshly cut, and of dull-gray color when oxidized by air. On account of its great affinity for oxygen, it must be kept immersed in a liquid free from oxygen, such as naphtha or benzene.

Sodium is a very abundant element, and very widely diffused. It occurs

naturally, in large quantities, as chloride, in sea-water, rock-salt, salt springs, and many mineral waters; more rarely as carbonate, borate, and sulphate, in solution or in the solid state, and as silicate in many minerals.

Soda (sodium hydroxide; caustic soda; sodium hydrate) occurs in white, deliquescent plates or sticks. It has an acid, caustic taste, and is soluble in 1.7 parts of cold water and 0.8 part of boiling water and in alcohol. The official solution of soda (soda-lye) contains 5 per cent. of caustic soda, and occurs as a clear, colorless liquid, of strong alkaline reaction, incompatible with fats, organic matter, and ammonium salts. The official solution of chlorinated soda (Labarraque's solution) consists of several chlorine compounds of sodium in aqueous solution; it should contain 2.6 per cent., or more, of available chlorine. It occurs as a pale-greenish liquid, having a chlorine odor and a disagreeable alkaline taste.

Sodium acetate occurs in colorless, monoclinic crystals, which effloresce upon exposure. It is soluble in 1.4 parts of cold and 0.5 part of boiling water, in 30 parts of cold and in 2 parts of boiling alcohol.

Sodium bicarbonate (acid sodium carbonate; baking-soda) occurs as a white, opaque powder, having a cooling, mildly-alkaline taste. It is soluble in 11.3 parts of water. This salt should not be given as an acid antidote, as it evolves large quantities of carbonic-acid gas. The official mixture of rhubarb and soda contains: fluid extract of rhubarb, 15 parts; fluid extract of ipecac, 3 parts; sodium bicarbonate, 35 parts; glycerin, 350 parts; spirit of peppermint, 35 parts; water, sufficient to make 1000 parts.

Sodium bisulphite (leucogen) occurs in opaque prisms or in granular powder,

having a faint, sulphurous odor and a disagreeable taste. It is soluble in 4 parts of cold and 2 parts of boiling water, and in 72 parts of alcohol. It is incompatible with acids.

Sodium carbonate (washing soda, alkaline carbonate) occurs in large, monoclinic crystals, having a strong alkaline taste, which effloresce upon exposure and should be 98.9 per cent. pure. It is soluble in 1.6 parts of cold and 0.2 part of boiling water, and in 1 part of glycerin.

Sodium chlorate occurs in colorless, odorless, crystals having a cooling, saline taste. It is soluble in 1.1 parts of cold and 0.5 part of boiling water, in 5 parts of glycerin, and in 100 parts of alcohol. This salt must not be triturated with sulphur or phosphorus, or any combustible substance, as severe explosion would result.

Sodium chloride (table-, sea-, or common salt) occurs in colorless, transparent crystals or in white crystalline powder having a pure saline taste. It is soluble in 2.8 parts of cold and in 2.5 parts of boiling water.

Sodium hyposulphite (sodium thio-sulphate) occurs in white, transparent, monoclinic prisms, having a cooling taste, with bitter after-taste. It is soluble in 0.65 part of water, but insoluble in alcohol. It is incompatible with iodine, acids, etc. It must be kept well stoppered.

Sodium nitrate (cubic nitre, or saltpeter; Chili saltpeter) occurs in colorless, transparent, rhombohedral crystals, having a saline, slightly-bitter taste. It is soluble in 1.3 parts of water and in 100 parts of alcohol. It is less active than saltpeter (potassium nitrate).

Sodium sulphate (Glauber's salt) occurs in colorless, monoclinic prisms or in granular crystals, having a bitter, saline taste. It is soluble in 2.8 parts

of water and in glycerin. Keep well stoppered.

Sodium sulphite occurs in colorless, monoclinic prisms, having a saline, sulphurous taste. It is soluble in 4 parts of cold and 0.9 part of boiling water and sparingly in alcohol. Keep well stoppered and cool.

Sodium silicate (soluble glass) occurs in white to grayish-white hard crystals and in flat pieces. It is soluble in water. The solution alone is official, and occurs as a yellowish or pale-greenish-yellow viscid liquid, having a sharp alkaline and saline taste. It is incompatible with acids. Keep rubber-stoppered.

Preparations and Doses.—Soda, U. S. P. (sodium hydrate; sodium hydroxide; caustic soda).

Liquor sodæ (U. S. P.), 5 to 20 minims.

Liquor sodæ chloratæ (U. S. P.), $\frac{1}{2}$ to 1 drachm.

Sodii acetat (U. S. P.), 10 to 40 grains.

Sodii arsenas (U. S. P.), $\frac{1}{24}$ to $\frac{1}{8}$ grain. (See ARSENIC.)

Liquor sodii arsenatis, U. S. P. (s. arsenas, 1 per cent.), 3 to 10 minims. (See ARSENIC.)

Sodii benzoas (U. S. P.), 10 to 60 grains. (See BENZOIC ACID.)

Sodii bicarbonas (U. S. P.), 10 to 60 grains.

Mistura rhei et sodæ (U. S. P.), $\frac{1}{2}$ to 2 ounces.

Pulvis effervescens compositus, U. S. P. (Sedlitz powder. See POTASSIUM), 1 powder.

Trochisci sodii bicarbonatis, U. S. P. (3 grains), 1 to 6 troches.

Sodii bisulphis (U. S. P.), 10 to 30 grains.

Sodii boras, U. S. P. (borax), 5 to 30 grains. (See BORACIC ACID.)

Sodii bromidum (U. S. P.), 10 to 60 grains. (See BROMINE.)

Sodii carbonas (U. S. P.), 5 to 20 grains.

Sodii carbonas exsiccatus (U. S. P.), 3 to 15 grains.

Sodii chloras (U. S. P.), 3 to 15 grains.

Sodii chloridum (U. S. P.), 10 to 60 grains.

Sodii hypophosphis (U. S. P.), 5 to 20 grains. (See PHOSPHORUS.)

Syrupus hypophosphitum (U. S. P.), 1 to 2 drachms. (See PHOSPHORUS.)

Sodii hyposulphis (U. S. P.), 5 to 24 grains.

Sodii iodidum (U. S. P.), 5 to 60 grains. (See IODINE.)

Sodii nitras (U. S. P.), 8 to 40 grains.

Sodii nitris (U. S. P.), 1 to 3 grains. (See NITRITES.)

Spiritus ætheris nitrosi (U. S. P.), $\frac{1}{4}$ to 1 drachm. (See NITRITES.)

Sodii phosphas, U. S. P. (sodium orthophosphate), 1 to 8 drachms. (See PHOSPHORUS.)

Sodii pyrophosphas (U. S. P.), 5 to 40 grains. (See PHOSPHORUS.)

Sodii salicylas (U. S. P.), 8 to 60 grains. (See SALICYLIC ACID.)

Sodii sulphas (U. S. P.), 1 to 8 drachms.

Sodii sulphis (U. S. P.), 10 to 60 grains.

Sodii sulphocarbolas, U. S. P. (sodium parafenolsulphonate), 8 to 30 grains. (See PHENIC ACID.)

Liquor sodii silicatis, U. S. P. (liquid glass).

Potassii et sodii tartras, U. S. P. (Rochelle salt), 1 to 4 drachms. (See POTASSIUM.)

Pasta Londoniensis (London paste or caustic,—equal parts of caustic soda and unslaked lime), used externally as a caustic.

Physiological Action.—The general action of the alkalies upon the system

has already been noted in the article upon potassium (*q. v.*). Sodium and its salts seem to have very little influence upon the higher animals, differing, in this respect, from potassium. The immediate effect of the sodium salts upon the blood is very slight. Podocæpow asserts that one part dissolved in twelve parts of blood does not affect either the physical characters of the red blood-corpuscles or the intensity of the ozone reaction. The effect of the continuous exhibition for a few days of large amounts of salt upon the human organism has been investigated by Münch (*Archiv Vereins Gemeinschaft Arbeiten*, B. 6, p. 369, '63), and found to be very feeble. At first there was a slight diminution of excretion, and a corresponding gain of the body in weight; but after a time the excretions increased and the weight of the body decreased. The variations in excretion affected chiefly the urine, but sometimes the perspiration and the fæces were also influenced. The urine was rendered alkaline, but its solid ingredients were scarcely at all affected.

Although a certain amount of the sodium salts is a necessary food for the higher animals, yet it is very doubtful whether an habitual excess of them has any decided effect upon nutrition; it must be conceded as established that the sodium salts do not increase tissue-waste (H. C. Wood).

It appears to be proved, clinically, that the alkaline salts of sodium given one or two hours before meals in full doses, excite gastric secretion and are of decided value in the treatment of chronic hepatic torpor, catarrhal jaundice, and especially of gall-stones or other affections associated with excessive viscosity of the biliary secretions (H. C. Wood). From the experiments of W. Rutherford (*Trans. Royal Society of Edinburgh*,

xxix) he concluded that sodium sulphate, sodium phosphate, and Rochelle salt very greatly increased biliary secretion, at the same time purging, while sodium chloride had some, but not a powerful, effect upon the liver. The sulphite, bisulphite, hyposulphite, chlorate, chloride, and the solution of chlorinated soda have antiseptic properties. Soda unites with the fats and saponifies them.

Even in large doses the soda salts exert no action upon the heart, cause no diminution in the temperature, and produce no apparent effect upon the brain, spinal cord, nerves, or muscles (Ringer).

The acetate is diuretic in its action, but less so than the potassium salt, and is seldom, if ever, used. H. C. Wood claims that it does not possess the same remedial powers as the potassium salt.

Sodium nitrate, although official, is seldom used in medicine.

The sulphite exposed to the air rapidly absorbs oxygen and becomes the sulphate. The hyposulphite is more stable. In the stomach the salts are, in part, decomposed by the gastric juice, and sulphurous acid is given off; in part they are converted into sulphates, and are eliminated partly by the intestinal canal, but chiefly by the kidneys, as sulphates. Bartholow, repeating the experiments of Polli, of Milan, who recommends the administration of these remedies in zymotic diseases, has demonstrated these facts.

Poisoning by Sodium and its Salts.—

Soda, like potassa and ammonia, is seldom taken for the purpose of suicide. (See POTASSIUM, POISONING BY.) The soda salts are far less poisonous than the potash salts, and, as we have noted, do not produce, like the latter, a direct poisonous action upon the heart. Soda salts, in two or three times the quantity which would prove fatal in the case of the potash salts, produce no effect upon

the system, except a passing weakness (Ringer).

Caustic soda is, however, a powerful corrosive poison; its solution is an acrid irritant poison in overdose. The carbonate and even the chloride are poisonous if taken in sufficient quantities. The solution of chlorinated soda is a powerful irritant, capable of producing severe inflammation of the skin or toxic gastro-enteritis.

The symptoms and treatment of poisoning by soda are similar to those of poisoning by the other alkalies (potash, lime, ammonia). Death follows, in fatal cases, from shock or gastro-enteritis. The chemical antidotes, vinegar, lemon-juice, or other weak acids and oils may be administered, after large draughts of water have been given to dilute the poison. Further treatment will be suggested by the symptoms.

Therapeutics. — **GASTRO-INTESTINAL DISORDERS.**—Soda and its alkaline salts are used extensively in disorders of the alimentary canal. Given in small doses before meals they increase the acid secretions of the stomach; in somewhat larger doses, given from a half-hour to one and a half-hours after meals, they neutralize any excess of acid in the stomach and favor intestinal digestion.

In gastric fermentation and sick headache arising from it, the bicarbonate may be used as an antacid; combined with calomel it adds to its efficiency in increasing the biliary flow, as it liquefies and thins the bile. In acidity of the stomach and in the vomiting attendant upon acute inflammatory diseases and the exanthemata, the bicarbonate is useful in the form of effervescent powder (sodium bicarbonate, 30 grains; tartaric acid, 10 grains; each dissolved separately in half a glass of water, the one solution added to the other and swallowed dur-

ing effervescence). (For the use of the sulphocarbonates in this condition see PHENIC ACID.)

In the treatment of children where an antacid is required and constipation is present, the bicarbonate is better than lime-water.

In yeasty vomiting, especially when *sarcinae* are present in the vomited matters, the sulphite is often curable in doses of from 5 to 20 grains. The vomiting due to acid fermentation of starches and sugars is relieved by the sulphite in doses of from 20 to 60 grains; sulphurous acid, in doses of from 5 to 60 minims well diluted, is, however, better.

In gastric indigestion the use of the chloride is followed by good results. The chloride combines with lactic acid in the stomach, forming lactate of sodium and liberating nascent hydrochloric acid, which acts not only by aiding digestion, but by increasing the production of pepsin from the pepsinogen of the gastric tubules. The usual dose for this purpose is from 10 to 20 grains.

In acid dyspepsia relief will follow the use of the bicarbonate taken a half-hour to an hour after meals. The following mixture is a good one: Sodium bicarbonate, 3 $\frac{1}{2}$ drachms; tinctures of ginger and of capsicum, of each, 1 drachm; tincture of nux vomica, 3 $\frac{1}{2}$ drachms; compound tincture of gentian, sufficient to make 5 ounces; of this a dessertspoonful may be taken, an hour after meals.

In catarrhal jaundice the bicarbonate combined with rhubarb is especially useful: the official mixture of rhubarb and soda may be given.

In chronic hepatic affections good results have followed the use of the solution of chlorinated soda, in doses of from $\frac{1}{2}$ to 2 drachms, diluted in from 4 to 8 ounces of water.

In constipation the sulphate is rarely

used in human beings, though largely in veterinary practice, as it is one of the most irritant of the saline purges, producing large, watery stools with considerable griping. The purgative dose is from $\frac{1}{2}$ to 1 ounce. Its use is contra-indicated if any intestinal inflammation be present. It is one of the constituents of Carlsbad, Hunyadi, and similar waters.

In the impending collapse of cholera, and in that following severe hæmorrhages as well, intravenous injections of the chloride in solution (93 grains to 1 quart of sterilized water at 100° F.: "normal salt solution") have been used as a prophylactic and restorative agent.

In intestinal infections of children at the breast a 7.5-per-mille solution injected under the skin of the abdomen, in quantities not exceeding in all 30 cubic centimetres in the twenty-four hours, apparently stimulated the entire system by increasing the blood-pressure and raising the temperature. The treatment seems to be indicated in infectious enteritis with hypothermy, and in chronic cases with loss of strength and low temperature, but it has no effect on the diarrhoea, general nutrition, or any of the phenomena other than those of collapse. Barbier (*Sem. Méd.*, p. 488, '96).

Literature of '97-'98-'99.

The purpose of irrigation after abdominal section is not only to cleanse the parts, but to stimulate the patient and overcome shock. Normal salt solution corresponds in specific gravity with the normal serum of the blood; has not been known to have any deleterious effect upon the tissues; is prepared by dissolving 90 grains of sodium chloride in 33½ ounces of distilled water. The solution is filtered into a clean flask stopped with non-absorbent cotton, and sterilized in an Arnold steam-sterilizer. Pus or other infective material should first be sponged out with pledgets of sterile gauze before irrigation is used, to avoid disseminating the sepsis. Salt solution at a temperature of 112° F. may be left in the abdominal cavity, from

half a pint to several quarts, to lessen shock and prevent thirst, which is usually intense after abdominal sections. Hunter Robb (*Columbus Med. Jour.*, June 7, '98).

The use of saline solution by the bowel is followed by good results, and has none of the disadvantages of either intravenous or hypodermic injections. The patient receives a rectal injection of a pint of hot salt solution in the proportion of 7.5 per 1000, and this may be repeated, if the collapse is grave or the hæmorrhage has been great, two or three times in the course of a day. Cases observed where as much as 3 quarts have been absorbed in the course of twenty-four hours. Should the bowel become intolerant, then other methods have to be resorted to. Pauchet (*Jour. de Méd. de Paris; Georgia Jour. of Med. and Surg.*, July, '98).

In cancer of the stomach the use of the chlorate has, in some cases, been followed by the happiest results. The initial dose is 2 drachms daily, in divided doses; this dose is gradually increased until 4 drachms are taken daily. If albuminuria be present or be developed during the course of medication, this treatment is contra-indicated. (Brisaud.)

In mercurial stomatitis, aphthæ, mucous patches, ulcers of the tonsils, the sulphite in solution (1 to 8) may be applied by a mop or in the form of spray.

Seat-worms (oxyuria) may be dislodged from the rectum by injection of a solution of the chloride: the injections remove the worms and relieve the intense itching.

In dysentery the use of the nitrate, in drachm doses, freely diluted, every three hours, has been recommended.

CUTANEOUS DISORDERS. — In acute eczema, when there is much serous discharge, no application is more efficient than the following: Sodium carbonate, $\frac{1}{2}$ drachm; water, 1 pint; cover the eruption with lint soaked in this solu-

tion, which may be made stronger in old cases where the skin is much thickened (Bartholow). When the weeping has ceased and mere desquamation remains, the alkali ceases to be of use (Ringer).

The pruritus of eczema, lichen, urticaria, dermatitis, burns, and frost-bite may be relieved by applications of the following: Sodium bicarbonate, 3 drachms; glycerin and distilled extract of witch-hazel, of each, 3 ounces. The itching of urticaria and lichen will often yield to a solution of carbonate (1 to 96); applied with a sponge it often gives great comfort and ease.

Poison-ivy eruption and other forms of pruritus may be soothed by the hyposulphite in solution (1 to 16), the solution of the bicarbonate, or by the solution of chlorinated soda diluted (1 to 32).

In parasitic skin diseases, especially those due to the trichophyton fungus, as pityriasis versicolor, the hyposulphite (1 to 8) in solution or ointment is valuable. Startin recommends the following: Sodium hyposulphite, 3 ounces; dilute sulphurous acid, $\frac{1}{2}$ ounce; water, sufficient to make 1 pint. In tinea versicolor and pruritus vulvæ Fox finds the following useful: Sodium hyposulphite, 4 drachms; glycerin, 2 drachms; water, sufficient to make 6 ounces.

In scabies the hyposulphite has been used successfully. After the morning bath apply the hyposulphite in solution (1 to 1) to the affected part and allow it to dry on the skin; at night bathe with the following lotion, which may be diluted if found too strong: Dilute hydrochloric acid, 4 ounces; distilled water, 6 ounces. (Ohmann-Dumesnil.)

For the removal of freckles, sunburn, and tan, Trousseau recommends the use of the following lotion: Sodium chloride, 2 drachms; potassium carbonate, 3

drachms; rose-water, 8 ounces; orange-flower water, 2 ounces. The inflammation of sunburn may be subdued by applications of the bicarbonate in solution.

In hyperidrosis of the feet and the axillæ a solution of the carbonate freely applied locally will remove the fœtor and diminish the secretion of sweat.

In burns and scalds the bicarbonate in powder or in solution will relieve the pain and soreness very promptly.

The carbonate is used externally, when it is desirable to soften or remove scaly or scabby accumulations upon the skin, as in certain forms of eczema, plica polonica, etc.

GENITO-URINARY DISORDERS.—Irritation of the urinary organs due to an excess of acid is allayed by the bicarbonate, in doses of 10 to 20 grains, given, in a glass of water, every four hours. Huchard recommended the daily administration of 2 to 10 drachms of the bicarbonate in the hyperacidity of the stomach accompanying diabetes; he believes that such use of the bicarbonate averted threatened coma in a diabetic patient under his care.

In cystitis a 1-per-cent. solution of the bicarbonate may be used to wash out the bladder, when an acid condition of that viscus exists.

Gonorrhœa is relieved by injections of a 1-per-cent. solution of the bicarbonate.

In malarial hæmaturia the hyposulphite is given with advantage in doses of from 10 to 30 grains, every four hours. Its mode of action is unknown.

Diabetes, when arising from disordered digestion in obese subjects, is benefited by soda and its alkaline salts; the amount of sugar excreted is, however, not lessened.

In uræmia, dyspnœa, and eclampsia, the intravenous injection of normal salt solution (93 grains to 1 quart) has been

followed by excellent results; previous bleeding enhances the value of this method of treatment.

LARYNGOLOGICAL AND RESPIRATORY DISORDERS.—In asthma the use of the nitrate in 3- or 4-grain doses has been highly commended.

In pulmonary tuberculosis, when the bronchial secretion was scanty and viscid, E. Maragliano obtained good results from the use of the following, as a spray: Sodium bicarbonate, 15 to 30 grains; muriate of morphine, $\frac{3}{4}$ grain; distilled water, $3\frac{1}{2}$ ounces.

In pulmonary hæmorrhage the administration of dry salt is a popular remedy.

In capillary and other hæmorrhages Reverdin claims that 2-grain doses of the sulphate every hour are of great value. It must be given by mouth or intravenously, not hypodermically, as it is then useless.

Literature of '97-'98-'99.

Sulphate of soda as a styptic is especially useful in cases of epistaxis, of metrorrhagia, of capillary hæmoptysis, and in the hæmorrhagic diathesis. It seems to act like calcium chloride, by increasing the rapidity with which the blood clots, and its styptic action is equally well marked, whether it be given by the mouth or by intravenous injection. Its administration hypodermically into the subcutaneous tissue does not give the same result. The dose is $1\frac{1}{2}$ grains every hour until the bleeding stops. Reverdin (*Revue Méd. de la Suisse Rom.*, Jan. 20, '97).

In severe hæmorrhage with threatened collapse, the use of normal salt solution by intravenous injection is indicated.

In acute tonsillitis, catarrhal conditions, bronchitis, etc., the bicarbonate in solution may be combined with hamamelis, belladonna, or other remedial agent.

The early stages of coryza in an adult of medium size and weight may be suc-

cessfully treated by 20 to 30 grains of the bicarbonate of soda given in 2 or 3 ounces of water, every half-hour, for three doses, and a fourth dose at the expiration of an hour from the last one. Two to four hours are then allowed to elapse, that the effect may be seen, and the four doses are repeated if there seems to be necessity, as is frequently the case. After waiting two to four hours more the same course may be taken again. To be promptly effective it should be begun with the earliest indications of coryza and sneezing, when it rarely fails to break up the cold, even in persons much inclined to "colds." Bulkley (*Med. Rec.*, Jan. 18, '96).

Bicarbonate of sodium will not only cure a cold, but will also prevent future attacks by curing the etiological factor, indigestion. L. W. Zwisohn (*Med. Rec.*, Feb. 15, '96).

In affections of the throat and fauces the chlorate is better and safer than the potash salt.

In epithelioma of the mucous membrane of the upper air-passages the use of the chlorate has been recommended.

In malignant sore throat and diphtheria the solution of chlorinated soda ($\frac{1}{2}$ to 2 drachms in water, 4 to 8 ounces) has been used as a gargle. The sulphite in solution (1 to 8) is an excellent remedy employed as a gargle, spray, or local application; the same salt is also used internally in combination with sulphur and calomel.

Solutions of the bicarbonate are extensively used in catarrhal conditions to soften and remove dried secretions and thickened mucus. Dobell's solution (sodium bicarbonate and borax, of each, 2 drachms; carbolic acid, 24 grains; glycerin, 14 drachms; water, 1 pint) is largely used for this purpose. E. Pyncheon advises the following as better: Sodium bicarbonate and borax, of each, 2 ounces; listerin, 8 ounces; glycerin, $1\frac{1}{2}$ pints; of this add 1 ounce to 1 pint of water. This is a bland, pleasant,

alkaline solution having about the same specific gravity as the blood (1.015).

GYNÆCOLOGICAL AND PUERPERAL DISORDERS.—Leucorrhœa, when dependent upon an increased secretion of the cervical glands, yields to injections of a weak solution (1 to 96) of the bicarbonate. This secretion is strongly alkaline, and is checked on the general principle that alkalies check alkaline secretions.

In the palliative treatment of cancer of the uterus, Boucher, of Rouen (*Ther. Woeh.*, Aug. 16, '96), prescribes the following: Sodium chlorate, 2 parts; syrup of orange-flowers, 3 parts; distilled water, 10 parts; of this two "spoonfuls" are to be taken during the day at first and then gradually increased to 8 "spoonfuls." The following powder is applied on intracervical tampons: Sodium chlorate and bismuth nitrate, of each, 2 parts; iodoform, 1 part. In addition the vagina is irrigated daily with a solution of 150 grains of sodium chlorate in a quart of boiled water. This method of treatment is claimed to prolong life, in many cases, for a year, and make it reasonably tolerable.

In puerperal metritis the solution of chlorinated soda (1 part to 10 or 12 of water) has been used as an antiseptic injection. In the same strength it may be used as a vaginal douche when the lochial discharge becomes fœtid. It is also a useful injection in simple and gonorrhœal vaginitis.

In threatened collapse from post-partum hæmorrhage or hæmorrhage from placenta prævia, intravenous injections and intraperitoneal infusion of normal salt solution must not be forgotten.

Literature of '97-'98-'99.

After grave hæmorrhage in pregnancy or labor a saline intravenous injection is

the best method of treatment for acute anæmia.

At least from 1500 to 2000 grammes of the solution must be injected. In less severe cases 200 grammes can be injected subcutaneously. Amillet (*L'Obstét.*, July 15, '97).

LITILEMIC DISORDERS.—Rheumatism is amenable to the action of the alkalies. The bicarbonate has been largely used and is of great service in allaying the pain and soreness of the joints when given internally in doses of from 15 to 30 grains every four hours. It is also used in solution as a lotion, applied around the joints on lint or cloths. The nitrate in solution (1 to 3) has been used externally in like manner. The acetate has been given in acute rheumatism and gout, but its value is much less than the potash salt.

Literature of '97-'98-'99.

The use of rectal injections of large doses of sodium salicylate is recommended in diverse, painful, articular lesions, particularly of rheumatic origin. From 8 even up to 12 grammes of the salicylate may be used per day, in two injections of a cupful of water each, to which are added, if desired, several drops of laudanum. The quantity of the salicylate is reduced by 1 gramme every other day, according to the results obtained, and when 7 grammes are being given, only one injection is made daily, in the evening. Should the pains recur, the doses are again increased. Harlet (*Sem. Méd.*, vol. xviii, p. 114).

SURGICAL DISORDERS.—In fractures and sprains the solution of the silicate is a valuable dressing, as it rapidly becomes hard and immovable when painted over the bandages and thus forms an immovable splint which is cleaner than plaster of Paris and equally effective.

Morbid growths, warts, etc., may be removed by applications of caustic soda or of London paste.

Foul ulcers, sinuses, etc., may be cleansed by the solution of chlorinated soda diluted ($\frac{1}{2}$ to 2 drachms in 4 to 8 ounces of water).

Literature of '97-'98-'99.

The application of compresses saturated with a 2-per-cent. solution of chemically-pure bicarbonate of sodium and covered with some impermeable material has the effect of drying up purulent secretion and cutting short phlegmonous inflammations. An incision is made into the suppurative focus, and after the pus is squeezed out a compress soaked in a 2-per-cent. solution of bicarbonate of sodium is applied. N. V. Georgevsky (*Sem. Méd.*, Mar. 3, '97).

Alkaline dressings, whether moist or dry, very rapidly reduce the inflammation, suppurative or otherwise, and cause rapid healing of wounds. The method employed is to apply the dressing of absorbent wool on ordinary principles, using merely a 2-per-cent. solution of bicarbonate of soda, or in some cases vaselin and bicarbonate (1 in 25), or the soda may be applied directly in the form of a powder. Brückner (*Oceid. Med. Times*, xii, p. 312, '98).

ANTIDOTAL USES.—In poisoning by the acids, soda and the carbonate are useful antidotes. The bicarbonate is not as well adapted to this use in that the larger volume of carbon dioxide evolved may cause rupture of a viscus weakened through the corrosive action of the poison.

In poisoning by coal-gas and by carbon dioxide intravenous injections of normal salt solution have saved life, after preliminary bleeding from the arm.

Nocher (*Centrall. f. Chir.*, Nos. 14, 15, '82) reports the recovery of two patients with severe iodoform poisoning through the use of a normal salt infusion of 1 $\frac{1}{2}$ pints.

SPASMODIC LARYNGITIS. See RESPIRATORY ORGANS, NEUROSES OF.

SPASMS AND CONVULSIONS IN CHILDREN.

Tetany.—Tetany is a motor neurosis called by some authorities a disease, but is more generally described as a mere disorder based upon several pathological factors which are more or less constant. It is probably of toxic origin and bears close etiological relationship to rickets; being based upon similar causative factors and sharing some of the symptom-phases of that disease. It is far from common, yet cannot be considered rare; and is much more frequently recognized of late years since its entity is better known and clearly described. Tetany is manifested by characteristic attitudes of the hands and certain intermittent tonic cramps of the muscles of the arms and legs, by an excessive electrical irritability, and by periods of latency, during which the cramps can be induced.

Symptoms.—The symptoms of tetany are to be divided into those of the attack and those of the period of latency. The onset of the paroxysms may be preceded by sensory phenomena, but is often sudden and without warning. The sensations are usually vague tingling pains in the forearms and legs, followed soon by a tonic spasm or a stiffness in the muscles. This spasm is most marked in the upper extremities, giving rise to such a pronounced rigidity that it is almost impossible to overcome the resistance by active effort on the part of another. Occasionally, the adductors of the thighs and arms are involved, causing the arms and legs to be drawn together; more rarely the muscles of the neck are involved, and also those of the face and trunk. Morse (*Edinburgh Med. Jour.*, July, '99) says the only true pathognomonic symptom is spontaneous intermittent paroxysmal muscular contractions. The most common seat of these

contractures is in the muscles of the forearm, the fingers being flexed at the metacarpo-phalangeal joints, while the phalanges are extended, the thumbs being strongly adducted, the wrists acutely flexed, and the hands turned to the ulnar side. The position of the hand is called the "accoucher's hand" or the "writing hand." Other attitudes are, however, occasionally seen, such as a firm clutching or even complete extension of the fingers. The forearm may be flexed upon the arm, the arm adducted to the shoulder.

If the lower extremities are involved, the thighs may be adducted, the legs extended or flexed; the toes are apt to assume the position of talipes equinus. The spasms may affect the muscles of the abdomen, the back, the diaphragm, and the thoracic muscles; hence inspiration is endangered and cyanosis may result, even consciousness being lost (Weiss). Trismus is rare, yet opisthotonos is not exceptional. Other muscles may be affected, as of the eyes, the œsophagus, the pharynx, the larynx, or even the bladder. Laryngeal spasm is a common accompaniment of the disorder. Naturally, this degree of overtonicity may cause muscular pains. The degree of spasm varies, and also its length. It may last from two minutes to two hours or more. As has been said, the involvement of the muscles is symmetrical. Cases have been reported of one side only, or unilateral for a time. In the contracted muscles fibrillary twitchings have occurred; clonic movements almost never. Tremor is common. The spasm begins in the periphery, not from within outward, as in tetanus; nor are the masseters early affected, as in that more serious malady; nor is reflex excitability high; nor is the spasm continuous as in tetanus. During the intervals the patient is comparatively

comfortable. The muscles are often tender and sore, and they are weakened. The intervals are variable: usually a few hours, or it may be several days or weeks. Other symptoms are those of Trousseau, already mentioned. This is the fact that, if, during the passive interval, the limb be grasped in such a way that the great nerves or arteries which lie along the under surface of the limbs are pressed upon forcibly, the characteristic cramp can be made to return. It may require some continuance of this pressure to elicit the phenomenon, but when it is present it is regarded as pathognomonic of tetany. This is not always to be obtained: in perhaps only one-fourth of all cases. Its value is great in demonstrating the existence of "latent tetany": a form in which there is at no time a clearly-marked contracture. Chvostek's sign is rare in children. It consists in an extraordinary susceptibility of the nerves in tetany to mechanical impressions. A blow with a percussion-hammer over the facial nerve produces a twitching of the angle of the mouth or of all the muscles of the facial distribution.

The third important symptom of tetany, known as Erb's sign, is a greatly exaggerated electrical excitability of the nerves. Weak faradic or galvanic currents produce muscular contractions in excess of the normal response. Cathodal closure contractions are found with small currents, but also with moderate currents; also cathodal closure tetanus, and anodal opening tetanus, which are not observed in any other condition.

The most convenient test, and one which usually suffices in an affected person, is the increased mechanical excitability, a simple touch, a light pressure on nerve, being enough to produce contractions in the muscles supplied by

it. It is less painful to the subject than to induce an attack by pressure on a large trunk or artery. (B. Sachs.)

Sensory phenomena are few; there are no disturbances of cutaneous sensibility. Headache, vertigo, nystagmus, and tinnitus aurium are described as co-existing. Temperature elevation is only rarely produced, but may be present because of some underlying condition.

Respiration is not, as a rule, affected. Dyspnoea is sometimes produced by fixation of the muscles of the thorax and the diaphragm. The pulse is often increased in frequency. The urine is rarely affected; it may be increased in amount. Nephritis occurs occasionally. There are seen, at times, certain nutritive disturbances affecting the hair, nails, etc. The reflexes do not show any characteristic alterations, and are, as a rule, normal.

The duration of an attack of tetany is most variable. There may be many remissions of greater or less severity, of shorter or longer periods of abeyance.

Diagnosis.—The clinical picture of tetany is thoroughly characteristic, and should be easily recognized.

The position of the hands, the fingers grouped together or held rigidly in this or some other attitude, as in extension, the legs oftentimes affected, as well or both arms and legs firmly adducted, should instantly excite suspicion. On investigation the sign of Trousseau would reveal the condition even during the periods of latency; that of Chvostek (irritability to slight mechanical stimuli) and that of Erb (electrical excitability as described) should make the diagnosis clear. Morse regards the one symptom pathognomonic of tetany: the spontaneous intermittent, paroxysmal conditions of the muscles of the forearms.

Not all the characteristic symptoms are

seen in each case, and the absence of some one or other does not vitiate the diagnosis.

Literature of '97-'98-'99.

The diagnosis of tetany is personally reserved for those alone in whom a spontaneous characteristic contracture occurs, and the habit which has arisen, of describing laryngismus stridulus—Chvostek's symptom and Trousseau's phenomenon—as being symptomatic of tetany, is deplored. Cases in which such symptoms are grouped as latent tetany are never transformed into true tetany. It is only by holding strictly to this point of view that the clinical individuality of tetany as a disease can be maintained. Tetany is a disease resembling, in many respects, epilepsy, and having its origin in various predisposing causes, arising frequently in rickety children, without being a manifestation of that disease; frequently in children suffering from gastro-intestinal trouble, and occasionally at the commencement of the infectious fevers and acute illnesses. The toxins of ptomaines resulting from these various conditions have a functional rather than an organic effect on the central and peripheral nervous system, producing the characteristic spasm. Romme (*Gaz. Hebdom. de Méd.*, Jan. 24, '97).

Etiology.—Tetany arises in certain localities, and is not seen again for long periods. It may become epidemic (Bruns). The condition was described by Trousseau originally, who discovered the important symptom known by his name, viz.: that an attack could be induced in an affected subject by compressing the arteries and the nerve-trunks. Tetany occurs in both adults and children, in about equal frequency (B. Sachs), but most cases are seen in the very young. Holt says it is usually seen in early infancy. Barthez and Sanné found it more often in children and most in infants. Griffith found 66 per cent. under two years of age.

The disorder is much more common

among the children of the lower classes, and those whose surroundings are unwholesome. It almost always follows upon depressing conditions, overexertion or recognizable disorders or diseases, especially the transmissible ones; hence its pathology is regarded as a toxæmia, or probably of a complex sort, perhaps a mere neurosis. It is frequently associated with rickets. Rarely it has resulted from a known poison, such as lead, alcohol, or ergot. It occurs as a finality to, or associated with, structural diseases of the nerves, and is known to result from extirpation of the thyroid gland. That the thyroid gland secretes a something, the absence or excess of which is followed by a perturbation of the normal nervous balance, is a fascinating view, of which Ewald makes a strong point. Weiss pointed out the connection between these toxins and tetany. That intestinal parasites secrete a peculiarly disturbing toxin is urged by Albu and others. Maestro advocates the administration of thyroid gland, and exhibits clinical findings from this measure which are convincing; and, in this, S. S. Adams follows him confidently. Tetany was at one time regarded as an occupation neurosis, but Kussmaul corrected this view. Any exhausting disease is a possible cause of tetany in those predisposed to this form of motor disturbance. The connection of the disease with rickets is still a topic of discussion.

The etiology of tetany in childhood is not clear. It never affects healthy children. Rachitis is of important predisposing influence. The direct cause of the attack is some gastro-intestinal disturbance, proved by the frequent association of tetany and acute dyspepsia, and the effect of treatment directed to such conditions. Hauser (*Berl. klin. Woch.*, No. 35, '96).

Pathological Anatomy.—No constant nor characteristic lesion has been found

present at autopsies in tetany. Serous exudation into the cervical cord and into the ventricles of the brain, sclerotic changes, spinal extradural hæmorrhage, atrophy in the ganglion-cells and nerve-fibres, and proliferation of the neuroglia are among the conditions found, as enumerated by Dercum.

The subject has been variously viewed by those who have made researches in this line (Langhans, Weiss, Gowers, Schlesinger, and others), and little other than speculations are offered. The facts are scanty as yet, and it is better to content ourselves for the present with the view that tetany is due to the effects of a toxin or toxins upon the entire nervous system in one so predisposed.

Romme (*Gaz. Hebdom. de Méd. et de Chir.*, Jan. 24, '97), reviewing the claims of various authors as to the etiology of tetany, concludes that the views of Kassowitz and his school (that it is a manifestation of rickets), and those of others who would ascribe the condition to any especial primary disease, are incorrect, as there are no constant post-mortem findings in tetany, and it occurs in connection with various diseases.

Clinical and pathological studies tell us only that the main symptoms are evidences of mechanical or reflex hyperexcitability of the cord and peripheral nerves due to a diversity of causes.

In an analytical study of 6822 children, with special attention to determining the nature of tetany and its relationship to rickets and laryngeal spasm, Cassel (*Deut. med. Woch.*, Jan. 28, '97) found 60 cases of tetany. The nutrition was good in 14, moderately good in 13, poor in 23, and bad in 10. All presented spontaneous intermittent spasm, which could be induced by pressure upon the large nerves and vessels of the affected parts. In all but 3 the facial phe-

nomenon was present. Only 2 had laryngeal spasm, and both of these presented craniotabes in addition to other symptoms of rickets. Without exception, the children were nervous and slept badly. Fourteen presented a rise of temperature; in 9 the disorder was the result of complicating conditions, and in the remainder it arose without apparent cause. In 21 cases digestive disturbance preceded or accompanied the tetany, in 5 there was chronic dyspepsia, in 43 digestive disorder, in 6 obstinate constipation, and in 4 habitual vomiting. Rickets was present in 52 of the 60 cases; in only 8 there was no trace of rickets. Tetany was seen throughout the entire year, although the largest number appeared to occur in the spring and late autumn. There was no suggestion of an epidemic occurrence of the disease, nor was there any relation as to frequency between tetany, rickets, laryngeal spasm, and craniotabes. Cassel concludes that tetany is neither a complication of rickets nor of digestive disturbance, but is dependent upon unfavorable conditions of living, improper nutrition, and bad air.

The evidences point to the conclusion that tetany is a disorder of the nerves, somewhat generally distributed, and of toxic origin. It arises, almost always, in those who have suffered from exhausting conditions, depressing circumstances, or acute diseases, or all three.

Prognosis.—The prognosis of tetany, on the whole, is favorable. Most cases recover. Sievers (*Berl. klin. Woch.*, Nos. 31, 32, '98) notes two fatal cases which occurred in connection with dilatation of the stomach. In both there were stenosis of the pylorus from healed ulcers and enormous dilation.

In all the reports of fatal cases of tetany twenty-seven in number, there was usually found dilation due to stenosis

from scars of pyloric or duodenal ulcers, or ulcer and scar without stenosis. Those cases which follow upon extirpation of the thyroid gland are usually fatal.

Treatment.—If rickets be accepted as the essential cause, it is plain we must determine what has produced that disease; and the findings of the foremost clinicians yet are limited here, also, to much the same factors as give origin to tetany. The disorder is one chiefly of excess of motion; and prodigality of motion—as I have constantly maintained, in dealing with disorders of motion, such as chorea—is always followed by exhaustion (fatigue neuroses); hence the fundamental need for all such states is absolute rest for both body and mind. The next indication is to remove all sources of peripheral irritation. The mass of evidence is in favor of gastro-intestinal irritation being the chief factor; hence the digestive organs will need fullest attention. As toxins are admitted to be the chief source of disturbance in tetany, eliminants are also in order. A few well-directed doses of calomel will meet many indications. Beyond this, and a regulation of diet, it is seldom needful to go. If the spasmodic phenomena are excessive or painful, it is well to proceed in the same lines as in dealing with convulsions. The inhalation of chloroform, or a mixture of chloroform, nitrite of amyl, and ether (parts 3, 1, and 5), will hold the spasm in check. Sedatives, such as the bromides, chloral, and hyoscyne hydrobromate may then be used, or, possibly, morphine hypodermically. Finally nutritive tonics will be required in most cases, and to be maintained for a long time. (See CONVULSIONS.)

Literature of '97-'98-'99.

The thyroid treatment has been applied to tetany with some success. The thyroid gland was given raw or slightly

cooked, and the dose, small to begin with, was carefully increased to 30 grains a day. In idiopathic tetany it diminished the intensity and the frequency of the attacks and shortened the duration of the disease. This treatment is not antagonistic to the symptomatic treatment, as it does not present any incompatibility with the methods ordinarily employed. Maestro (*Lancet*, p. 334, Jan. 30, '97).

Automatic Movements in Children.

Automatic movements may occur in the following diseases:—

I. Anomalous epilepsy.

II. Hysteria of childhood. General, quasipurposful. Hysterical, salaam, and hysterical eclampsia rotans.

III. Athetosis (athetoid movements in asthenic conditions):

IV. Automatic rhythmical movements. These are better displayed in a table:—

Automatic rhythmical movements	Head-nodding and shaking	Movements of assent. Negative move- ments.
	Gyrospasm. Head-banging. Eclampsia nutans, or salaam convulsions. Eclampsia rotans.	

V. Tic convulsif.

VI. Induced automatic movements.

It may be advantageous to examine each division carefully and endeavor to define diagnostic features and differences, and in a few instances it is possible to assign a cause.

Anomalous Epilepsies.—In these forms there is exhibited a most marked display of automatic imperative movements. By relating a typical case a good concept can be formed: A boy, aged 17; weakly, nervous, and irritable. The attack begins usually with a sharp cry and without further development. The patient commences to run aimlessly through the street, usually at a good speed. If stopped by anyone, he may struggle vio-

lently, or even pass into epileptic convulsions, from which he awakens exhausted, asks for water and promptly goes to sleep. His apparent oblivion to the external world, the inability to make any impression by speaking to him, his avoidance of collision with objects and people, and particularly his absence of remembrance when he awakes of events taking place during the attack, lead one to regard it a pure case of secondary consciousness of automatic and, usually, centric origin.

Some cases run round and round, only stopping to fall exhausted and senseless to the floor. Another variety manifests no motor excitation whatever; the patient will suddenly, in the midst of some rational action, wander quietly off by himself, accost persons on the street, and, at times, threaten to do violence if the one addressed does not agree to some absurd demand on his part. Then comes the awakening. The patient does not know where he is or how he got there, and exhibits signs of exhaustion and thirst.

The treatment of these cases is the same as that for idiopathic epilepsy.

Hysteria of Childhood.—In referring here to hysteria, we shall simply consider that type in which there are observed automatic movements.

Hysteria of childhood is a condition which frequently simulates anomalous epilepsy, and at times it is only with extreme difficulty that a differentiation can be made. Like epilepsy, there is often an initial scream, which differs in quality from that of epilepsy, and which usually is not given until the patient is aware that she (usually a female) has an audience. The patient then falls to the ground in a way that she will not be hurt. At times a very fair representation of opisthotonos is presented. En-

gorgement of veins about the head is frequently noted, and more or less active tonic spasm is present. After this follows a condition of relaxation, with wild quasipurposeful movements of the arms; broken short sentences, explosions of passion and profanity, weeping, laughing, and grinding of the teeth often follow. The larger and more sympathetic the audience, the more varied and emotional will be the manifestations.

Anæsthesia, paralyses, hallucinations, and ecstasies have their turn, and gradually the patient quiets down to normal. The notable feature in these cases is the imperative and purposeful movements, mostly confined to the arms, which the patient will often assert, during the attacks, she cannot possibly stop.

[Dr. Alfred Reginald Allen, my assistant, aborted a most pronounced one of these seizures in a hospital case by an hypodermic injection of sterilized water with a dull needle. In another case of the same kind he used hypnotism, the sudden command, successfully. J. MADISON TAYLOR.]

Athetosis should never be confused with any other automatic condition, and all that need be said of it here is that when hysterical, or secondary to some functional or mild disorder, a good prognosis may be given, otherwise it should be guarded.

Automatic Rhythmical Movements.

In this term are broadly included head-nodding, or movements of assent; head-shaking, or negation movements (synonymous with spasmus nutans and nictitatio spatia); gyrospasm; head-banging; eclampsia nutans, or salaam convulsions; and eclampsia rotans.

Head-nodding and head-shaking are manifestations which appear in the infant at any time between the ages of two and eighteen months. It is sometimes preceded by injury to the head, as might be

occasioned by a slight fall. But the condition has appeared so many times when such history cannot be elicited that it would lead one to think injury not an essential factor in the etiology. In most cases the nodding and shaking are preceded a week or ten days by nystagmus, which may be vertical or horizontal, or vertical in one eye and horizontal in the other. At times there is only a uniocular nystagmus. When the nodding and shaking appear they are usually limited to a few attacks a day, which tend to increase in number. There sometimes appear cases in which there is almost constant nutans of a mild type, with strong exacerbations. In the great majority of cases the movements seem to be accentuated when the attention is distracted, or if the child makes an effort to hold his head still. Caillé (Arch. Pæd. Soc., '89) reports cases where movements ceased when attention was fixed and also if eyes were bandaged. His treatment of the case was to keep the eyes bandaged for some weeks—only removing the dressing to flush out the conjunctivæ. Recovery ensued. The pupils are usually dilated, the eyegrounds normal. The few cases in which fundus changes have been found are coincidental. Occasionally there occur periods of unconsciousness, with marked deviation of eyes to right or left (Hadden).

Very frequently there is a history of rickets, and the rosary and other features are well marked. In most of Hadden's cases there occurred, as an early symptom, the throwing back of the head and looking at objects with partially-closed eyes.

Head-nodding is much rarer than head-shaking. Occasionally these alternate in the same patient.

If it be desirable at this time, with our limited knowledge of this condition, to

classify them under any particular heading, hysteria in childhood would seem to present the greatest claim, for in hysteria there are frequently salaam movements, pure and simple. Until more is known of the essential nature of those conditions, and their relation to the few different lesions which have been found in the brain at death, it will be an impossibility for us to go further than to offer surmises as regards a classification. They are so frequently associated with defective mental development that the suspicion of their being significant of some deep-seated developmental error is urgent.

When a combination of motor impulses by their cross-action imparts a rotary motion to the head, this is known as gyrospasm (Peterson). These spasmodic conditions sometimes increase during sleep. According to Peterson, the number of excursions of the head in these affections rarely exceeds two or three a second. The child may only have an attack during the night, or it may be so persistent that it suddenly awakens him every time he composes himself for sleep.

[The following is a case of gyrospasm of my own hitherto unreported: B. S., aged 6 months, female, Russian Hebrew, of excellent family history,—mother a large, vigorous woman with abundant breast-milk,—was brought to Polyclinic Dispensary for relief of gyrospasm. One older child, perfectly strong, was also breast-fed. This infant was regarded as exceptionally vigorous, had never been ill, held up its head at three months, and had no convulsions. Automatic movements began ten days ago without ascertainable cause. The first movement was forward-and-back nodding, alternating with a slight rotary action, noticed from time to time during the morning only. On the second day movement was more marked and constant, the series consisting of two or three nods, followed by fifteen or twenty rapid rota-

tions, then a quiet interval. In all there were perhaps twenty paroxysms during the day; these are now continuous, and do not altogether cease during sleep.

On examination the infant seems perfectly normal in other respects; is cheerful and intelligent, of good color, and well nourished. On endeavor to make the child fix its eyes or converge them the movements cease for a few seconds, and are replaced by lateral nystagmus, but soon the gyrospasm recurs with increased force. Lowering the eyes, the head leaning forward, also brings relief. The case recovered entirely in a short time. J. MADISON TAYLOR.]

In eclampsia nutans and rotans there is a bowing, or salaaming, movement of the neck. Hadden differentiates those conditions from head-nodding and head-banging, and calls eclampsia nutans and rotans a variety of epilepsy.

In anomalous or aberrant forms of epilepsy there is a salaaming, but also there are other signs of epilepsy.

A perfectly analogous condition to all the above automatic imperative movements may be induced by suggestion under hypnotism.

Other motor neuroses—such as habit chorea, habit spasm, convulsive tics, echolalia, coprolalia—are dealt with elsewhere.

A curious case was reported by Sée (St. Barthol. Hosp. Rep., '86) in which the brother of a case of head-banging was similarly affected while sleeping in the same bed. The symptoms disappeared immediately on the separation of the children.

Treatment.—The treatment of head-movements is change of air and climate, and nutritious food and out-of-door life, as much as possible; in short, improved hygiene, careful search being made for and correction of any source of reflex irritation, such as post-nasal adenoids, adherent prepuce, phimosis, dentitional

disturbances, intestinal disorders, intestinal parasites, etc.

Most of the sufferers are too young to warrant the correction of errors of refraction, though they may readily exert an influence. The condition of any of the aforesaid irritations may solve the difficulty. It is safe, nevertheless, to begin at once on a treatment by sedatives. Bromides, valerian, chloral, etc.; nutritive tonics, such as codliver-oil, iron, phosphorus; fatty and albuminous foods, and the organic nucleo-albumins are likewise indicated. H. C. Wood likens these conditions to those of chorea, which is due, in his opinion, to depression of the inhibitory centres governing the anterior cornual cells of cord. He accordingly recommends quinine as an inhibitory stimulant.

Convulsions.

A convulsion is a temporary overflow of motor impulses producing purposeless muscular contractions, alternating with relaxations for shorter or longer periods, attended by more or less loss of consciousness. If the alternations are rapid, the form is called clonic; if slow, the contractions being maintained for a variable time, it is called tonic. A spasm is a more or less rapidly alternating contraction and relaxation of certain muscles or groups of muscles affecting a limited portion of the body; it is essentially local, and, as a rule, does not involve the centres nor disturb consciousness. A tremor is a rapid rhythmical vibration in the muscles. Convulsions may be epileptiform, hysteroidal, or tetanic. In epileptic and hysteroidal convulsions consciousness is disturbed because these emanate from the brain-centres. In the tetanic form this is peripheral, and not central. In epileptic convulsions consciousness is lost or severely impaired, as a rule. In hys-

teria this is also true at times, wholly or in part, but is not to be expected. Local spasms may occur as disturbances of motion in the muscles of the vital organs, such as œsophageal, rectal, urethral, and the like. Vomiting is a local spasm; so are certain forms of nervous croup. Spasms of voluntary muscles in young children produce such alarming effects as laryngeal spasm, or laryngismus stridulus, child-crowing, and the like.

Automatic movements are irregular, involuntary muscular acts, more or less co-ordinated, and simulating voluntary acts.

Infantile Convulsions. — Convulsions occurring in young children constitute a symptom, not a disease. They vary widely in severity, beginning locally and becoming general, or they may prove to be overwhelming motor discharges so intense as to cause serious disablement or possible death. Modern writers deny the gravity of infantile convulsions, so far as immediate results are concerned, but readily admit that very grave subsequent effects often follow.

Literature of '97-'98-'99.

After-history personally studied in 85 cases of infantile convulsions, 40 of whom suffered from pronounced neuroses in later life. Of these 11 had epilepsy of a severe form, 14 had *petit mal*; 5 suffered from somnambulism, 4 from melancholia, 7 from chorea, and 9 from migraine. Of the 45 who were free from definite neuroses, 8 were pronouncedly eccentric, and nearly all the rest were below the average intelligence of their brothers and sisters. Coutts (Brit. Med. Jour., Apr. 19, '99).

Symptoms. — Almost anyone of moderate intelligence will readily recognize a well-marked convulsion or even a convulsive tendency; but it is of the utmost importance that the first observer shall carefully note and be able to relate ac-

curately the starting-point and phenomena of progress, the degree of severity, and the length of time it has persisted. On these facts will depend a proper diagnosis of the character and seat of the irritation. The slightest twitching of the thumb may indicate irritation or disease near the thumb-centre. So twitchings of the eyelid or movements in and around the corners of the mouth point to central disease. Unilateral convulsions do not necessarily indicate a local lesion, although they form a fair ground for suspicion of focal disease. There is usually some prodromal symptom more or less brief, such as slight twitchings alluded to in the muscles of the extremities or face, a general restlessness, and startings upon slight irritation from touch or noises. Immediately before the convulsion there is often pallor, a fixity of the eyes, or they may be rolled up into their orbits; these slight, isolated movements may pass into convulsive twitchings, extending rapidly over the entire body, or shifting from one side to another, or from one limb to the opposite one along with, or alternating with, movements in the face or head, retraction of the head, or rolling of the body over to one side or the other.

A succession of grimaces due to contraction of the facial muscles may be the only early change seen: or later the hands may be clenched, the thumbs being buried in the palms; the great toe extended downward—"carpo-pedal spasms"—or these phenomena again may be followed by a general commotion; frothing at the mouth; disturbed respiration and pulse, slow or rapid, usually irregular; sweating of the forehead, and blueness of the lips and face. The sphincters may become relaxed, urine and fæces being passed involuntary. After the fit there is usually evidence

of prostration, and temporary palsies not infrequently follow, due to exhaustion of the nerve-centres. One attack of convulsions is commonly followed by others, exhibiting an increasing susceptibility. Convulsions coming on in a child previously well point to some acute disease of exceptional severity, or possibly acute meningitis. Convulsions occurring in most forms of brain disease are not usually accompanied by marked temperature-rises, but are liable to exhibit pupillary changes, strabismus, rigidity, or localized palsies.

Etiology.—Convulsions, local or general, arise in excessive and irregular discharges of nerve-centres in the cortex or base of the brain. Nothnagel suggests a convulsive centre in the pons.

Experiments by Suschtschinski and Wyrubow (von Bechterew in *Neurol. Centralb.*, No. 4, '97) have shown that the convulsions caused by irritation of the pons are not the effects upon a convulsion centre, but due to the transmission of irritation to the cerebral hemispheres and especially the motor cortex.

The seat of discharge in convulsions is presumably in the ganglion-cells of the brain, and molecular disturbances in these cells necessary to the morbid discharge are determined either by direct irritation of those centres or reflexly through peripheral irritation. The phenomena have to do with exaltation of the lower centres or loss of inhibition in the higher centres, or both.

In infants the nervous system is structurally immature, but in process of rapid development. Even after structural completion time is required to attain functional stability.

At birth the lower centres only are developed; hence control is limited until the higher centres become competent to exert inhibition. In the earlier months

of life convulsions are common, progressively less so after birth to the first year of life (Kassowitz), and are more rare after the second year.

It is unusual, perhaps impossible, for a healthy child to suffer from convulsions, unless the exciting cause be overwhelming, such as trauma, an intense irritant, or poison. Convulsions readily occur in children of unstable equilibrium. This dangerous condition may arise from inheritance or become acquired, and is of very varying degree. One convulsion predisposes to another, and the habit may become fixed.

Some families are especially prone to suffer ill effects from motor excitements, or their infants offer but feeble resistance to excitants, be these physical or psychical. Again, individuals vary from time to time, and are rendered susceptible by depressing causes, nutritional and emotional, as well as by the onset of definite disease.

Exciting causes are chiefly reflex from peripheral irritations, inducing overactivity in convulsive centres. The history of many of these must be received with caution, since deeper causes can usually be found where careful search is made, more probably several causes acting together: vasomotor instability, temporary or prolonged; states of anæmia, variations in blood-supply and quality, along with states of certain special nerve irritation, as that of the fifth or gastro-intestinal supply and rickets, the extremes of heat and cold, produce conditions which react in convulsions readily to relatively slight exciting causes.

What part is actually played by disordered dentition is not determined, but the weight of modern evidence is against this being of great significance. Some go so far as to assert that it is absolutely *nil*, others admit that it exerts some posi-

tive influence. Certainly it is not shown to be a large factor. The lancing of the gum over an approaching tooth often relieves the spasm. In the same category of doubtful causes may be mentioned the presence of intestinal parasites, where removal is, however, of practical value.

Literature of '97-'98-'99.

Convulsions in male children are so often dependent upon an adherent prepuce that one should make it a rule, in such cases, to look for this condition and relieve it. Ewing (*Phila. Med. Jour.*, July 1, '99).

Of the determining causes, by far the most important is the use of improper food, unsuited in amount, kind, or condition to the needs of the young child. This acts often as both fundamental and exciting cause. Milk from a mother or wet-nurse may be vitiated by various causes,—fatigue, emotional,—or it may act as a medium of poisons,—such as alcohol,—and has been known to cause convulsions.

Literature of '97-'98-'99.

A nursing infant is often most seriously disturbed, and sometimes even thrown into violent convulsions, by changes in the lacteal secretion brought about by unusual or excessive coitus. A. C. Cotton (*Phila. Med. Jour.*, July 1, '99).

Other determining causes besides the visceral sensory distribution (gastro-intestinal) are such as disordered dentition (fifth nerve); the various infections, especially whooping-cough, syphilis, scarlatina, and the other exanthemata; ptomaines and leucomaines, uræmia, malaria, heat, cold, febrile states, burns, fatigue and depressing influences, blood-loss, shock, emotions, fright, anger, etc. Of poisons, some are the toxins generated within the organism alluded to, and others are swallowed, among which

should be borne in mind lead, alcohol, etc.

Interesting cases were reported by D. D. Stewart among a series of children poisoned by lead used as coloring matter in cakes. Meunier reports cases of convulsions caused in nursing where the nurse took large amounts of alcohol. Many of these causes are aggravated by meteorological conditions, especially of hot weather in summer. It has long been believed that convulsions frequently occurred as a prodrome in pneumonia, but Gossage and Coutts show a series of 166 cases with this symptom in only 8, or 4.7 per cent.

Convulsions—and these the more serious ones—are also due to various forms of cerebral disease: hæmorrhage, internal pressure as from rapidly increasing hydrocephalus or abscess, and emboli and thrombosis, and, above all, rickets. Only a small proportion of cases of convulsions, however, are demonstrated to occur in children who have evidences of rickets. In them motor disorders are more likely to be tetany and laryngospasm. The brain presumably suffers from malnutrition in all these disorders, and to this the instability is due.

Prognosis.—In estimating the dangers resulting from convulsions it is necessary to consider the nature and extent of the cause. In children of a markedly unstable nervous equilibrium a convulsion may mean little or nothing. Moreover, moderate convulsions occurring in young infants are of small import. Fits appearing as prodromes of acute febrile diseases are rarely serious and may not even indicate an unusually severe attack of the disease. When they occur after the establishment of the characteristic features of the disease they are of deeper significance, and may indicate the oncoming of nephritis, meningitis, or other grave com-

plications. Those points on which one is likely to base a serious prognosis are extreme prolongation or frequent recurrence of the convulsions; also profound disturbances of the circulation, stupor, or subsequent prostration.

Gossage and Coutts lay great stress on the facts that the danger of future neurotic manifestations has been underestimated: predisposing causes are of more importance than the exciting causes; and that the slighter exciting causes will not produce convulsions except in children so predisposed. Statistics were produced at the 1899 meeting of the British Medical Association, showing that over one-half of the patients who had exhibited convulsions in infancy suffered from some form of neurosis. And they were not so much to be ascribed to the malnutrition of the nervous system in infancy or to damage during the convulsive stage as to congenital faulty development. This particularly in children of gouty, nervous, rheumatic, or diabetic parents, and it is in whom such a family diathesis is known to exist that any extreme of reflex irritation must be repressed or it will result in a nervous explosion.

Treatment.—The treatment of convulsions divides itself in two very unequal halves: to overcome the symptom and to master the underlying condition. The indications, for the first, are to hasten to the case with all speed, to promptly secure various items of equipment, which may, any or all, be needed, but the absence of any one of which may cause serious embarrassment, possibly danger of life.

A severe or continued condition of convulsions may produce serious damage to remote organs and tissues. The explosion may be overcome by the inhalation of chloroform, which, in the condition of such a state of nervous exaltation,

is quite safe. To this may be added, with advantage, nitrite of amyl and sulphuric ether. The mixture I have used for years most successfully in the paroxysm of pertussis is equally applicable here: amyl-nitrite, 1 drachm; spt. of chloroform, 3 drachms; ether. sulph., 5 drachms. It is well to loosen the clothing, or, better, to promptly remove them. Thus, many important points may be revealed. Often the child will be found in a bath of hot water, perhaps mustard is added. In the excitement this may have been so hot or irritating as to cause damage, and it is best to remove the child at once, and it may be necessary to investigate the condition of the skin and apply emollients. If not in a bath, it is often useful to apply mustard pack—which consists of 1 teaspoonful of dry mustard rubbed up with 1 ounce of water and added to a quart of hot water, and into this a sheet, or bath-towel is dipped and wrapped around the child. After this has been applied for a suitable time, or during the continuance of it, a careful search should be made for various sources of reflex irritation. The chief of these may be found in the digestive tract, and the next routine procedure to be recommended is to apply a cleansing enema. This enema serves several valuable ends in removing feces or undigested food, and, if hot, aids in stimulating capillary relaxation. If the temperature be found high, this can be followed, with advantage, by a cool enema. If subnormal, as is the case frequently in the convulsions following summer diarrhœas, a salt enema supplies fluid by imbibition, or hypodermoclysis may be even better. I have seen lives saved by this. In hyperpyrexia cold to the head is in most cases a useful measure. If congestive states are pronounced, local blood-letting by leeches is of much use, and is recom-

mended by Baginsky and others. Lumbar puncture is a safe measure too, and this I have done with great satisfaction many times. If the convulsions be unduly prolonged, the use of morphine hypodermically is both safe and gratifying. If the first dose (of, say, $\frac{1}{48}$ grain to a six-month-old baby) is not sufficient, a second may be given in an hour, of double the first dose, and again, in an hour, double of this, if needed.

Where there is asphyxia or marked cyanosis, oxygen is a valuable agent; this is best administered to infants through a large face-piece and one straight tube. When the bowels are sufficiently cleared sedatives can be administered by the rectum; chloral and the bromides are most used. For a six-month-old baby, 4 grains of chloral or 6 grains of bromide of sodium or strontium, one or both, may be given; for a baby of one year, 6 grains of chloral and 10 of a bromide is a suitable dose, to be repeated again at hourly intervals if needed. Authorities differ as to whether an emetic should be employed; but, if there is reason to believe that there is undigested food in the stomach, this should be used; and, while there may be theoretical objections, I have no reason to believe that harm has been thus caused. Emesis in children is so readily induced that there need be little fear of injurious effects unless excessive stimulus is employed by overdosing with emetics. So soon as the child can swallow, it is well to give a grain or two of calomel, which acts usefully in several ways, even if it does not purge. To produce a full laxation, where this seems necessary, milk of magnesia, castor-oil, or some other active drug can be employed. After having instituted these measures to overcome the activity of the convulsion a thorough search should be made for such sources of reflex

irritation as phimosis, an approaching tooth, foreign bodies in the nose or ears, etc. As soon as possible, the history of the case should be scrutinized for remoter conditions, such as the existence of a pneumonia, the possibility of the beginning of an exanthem, etc. It must be borne in mind that the occurrence of convulsions is much more frequent and vastly more dangerous during the progress than at the beginning of either pneumonias or the exanthemata. If they arise at the end of an exhausting disease, as of those two just mentioned, or of a prolonged diarrhoea, the process is essentially different and will call for other measures. If the urine contains albumin, which must be ascertained without delay, diaphoresis is important; but diuresis must not be neglected, and here repeated injections of warm salt solution through the bowel is of value, or also hypodermoclysis. Among the acute conditions which are competent to produce convulsions in healthy children are injuries to the head, which are liable to be followed by shock and are to be treated as such by external heat, cold to the head, and stimulating enemata. Sun-stroke and heat-exhaustion call for appropriate treatment; in the former, external cold is indicated, and, in the latter, heat and stimulants, of which among the best is coffee. An accidental cause may be mechanical obstruction of the upper air-passages, and, if apnoea is the chief difficulty, the introduction of a tongue-depressor, drawing the tongue firmly down and forward, may remove the symptom almost immediately. Lastly, it must not be forgotten that convulsions may be a phenomenon of impending death, when it is impossible to expect to relieve them; although it is oftentimes admissible to make use of strychnine hypodermically

and in large doses, and of other forms of stimulation.

J. MADISON TAYLOR,
Philadelphia.

SPECIFIC INFECTIOUS FEVERS.

Relapsing Fever (Famine Fever).

Definition.—An infectious fever caused by Obermeier's spirocheta characterized by a febrile paroxysm of about six days' duration, followed by a remission of about equal length, and one or more relapses of both paroxysm and remission.

Symptoms and Diagnosis.—Relapsing fever has not been met with in this country since 1869, when it occurred in New York and Philadelphia in epidemic form. The period of incubation is thought to be short: a week or less. The early symptoms are not characteristic: severe pain in the back and joints, chills, fever, and, particularly in young subjects, nausea and vomiting. Convulsions are occasionally observed in children. The pulse is rapid: 110 to 140 or more; and the temperature is high: 103° to 105° F. This parallelism is important, since it serves to differentiate relapsing fever from influenza, which disease it resembles. An attack of malarial fever is also suggested, the spleen being more or less enlarged almost from the start and profuse sweating being common. But the delirium which accompanies a high temperature, the prolonged duration of the paroxysm, the gastric symptoms, which are usually severe, serve to invalidate such a diagnosis. Typhoid fever is simulated in many instances, especially when petechiæ, which are sometimes observed, are present; but the rapid decline of practically all active symptoms after a few days clearly indicates the absence of this affection. Again, intestinal symptoms, except toward the crisis, are uncommon. Many manifestations of vary-

ing nature may appear in the course of the disease: jaundice, cough, parotitis, cervical adenitis, orchitis, œdema of the feet, monarticular or polyarticular inflammations, laryngitis, and glossitis. Again, various eruptions may appear: roseola, purpura, urticaria, herpes, and the rashes of scarlet fever and measles. Hæmatemesis, hæmaturia, and epistaxis are occasionally noted. The most serious complications observed are pneumonia and acute nephritis. The intensity of the symptoms steadily increases, as a rule, until the crisis appears: from three to seven days after the onset of the access. Diarrhœa and sweating are often the first signs of the remission; a rapid decline of temperature, to the normal or below, follows, and the period of convalescence begins.

In about one-third of the cases the fever does not return; in the remainder a new attack appears after a week's comparative comfort. The previous symptoms once more prevail, and are followed, as in the former experience, by a sudden crisis, a period of repose, and a third attack. As a rule, the disease ends here; but two more recurrences may appear, each successive attack increasing the patient's exhaustion. In weak and aged individuals death may thus be brought about; but, as a rule, the fatal issue occurs during or at the end of the first access. Deaths from rupture of the spleen have been reported. The fatality of the disease is small, being but 1.26 per cent. during the epidemic which occurred in Moscow in 1894, but it may reach 6 per cent., as was the case in the St. Petersburg epidemic.

Ulcerative conjunctivitis, various forms of paralysis, and the various complications occurring after exanthems are occasionally observed as sequels to the affection.

Etiology and Pathology.—Poverty, filth, insufficient or poor food, and other unhygienic conditions prepare the system for the invasion of the organism: a spirillum, or spirocheta. This micro-organism, a filamentous spiral, may readily be recognized in the blood, during the paroxysm, by its rapid movements among the red corpuscles. It disappears with the attack, and is superseded by what is thought to be its spores.

The blood of monkeys and human beings affected with recurrent fever shows that as the crisis approaches it becomes possessed of marked bactericidal power. The spirilla will live in normal blood for one hundred and sixty hours at a temperature of 37°. In the blood of a person who has just passed through a crisis they die often within an hour at this temperature. An experiment was made with the serum of monkeys that had been cured of it, and it was found possible by injecting such serum to limit the pyrexial period to two days and to avoid absolutely the relapse. Gabritchewsky (*Ann. de l'Inst. Pasteur*, Nov. 25, '96).

It is thought that the medium of transmission is through suctorial insects. Tietin (*Centralb. f. Bakt. Parasit.*, etc., Feb. 15, '97) studied this question during an epidemic which occurred at Odessa, Russia, in which 10,000 cases occurred. Hungry bed-bugs were allowed to bite a monkey that had the spirilli in his blood, and the blood of the insects was then examined. Organisms were found that were active for some time. A healthy monkey being then inoculated with this blood by injection, it rapidly developed the disease.

The morbid changes are not very marked; the spleen may, however, be greatly enlarged and soft, and the other viscera show evidences of degeneration. Nathanson noted changes in the cardiac ganglia, the degenerative process involving the protoplasm and the nucleus.

Literature of '97-'98-'99.

Phagocytosis occurs in the circulating blood in relapsing fever. In examining the blood of a patient shortly before death fragments of spirilla discovered in many of the leucocytes as well as large numbers of more perfect spirilla in the plasma. The intracellular spirilla stained but feebly, and were apparently in process of disintegration. Subsequent examination of the blood of a large number of patients suffering from relapsing fever showed similar appearances in all, and the same was true of the blood of a large number of artificially-immunized monkeys. Indeed, in these last the spirilla could be detected only in the corpuscles; none were found in the plasma. The inference drawn is that the immunity in these cases is due to heightened phagocytosis. Ivanoff (*Centralb. f. Bakt. u. Parasit.*, xxii, 117, '97).

Sex and age do not seem to influence the development of the disease, though the mortality among women and old subjects is greater. It is thought to be contagious and to afford no immunity against subsequent attacks.

Treatment.—Quinine is absolutely useless, except as a tonic during convalescence, and no medicinal treatment seems to curtail the attacks or prevent them. Symptomatic treatment, coupled with hygienic measures and nutritious, though easily-digested, food are indicated. An antispirechetic serum has recently been used with apparent success.

Literature of '97-'98-'99.

A large number of cases of relapsing fever personally treated with antispirechetic serum prepared by treating a horse with blood containing the spirilla. Of a total of 283 patients, 131 received the specific treatment, while 152 did not. Of 34 thoroughly treated, 1 died; a large number, 39 (47 per cent.), remained without relapse. Among the 152 not treated with the antitoxin 10 died, only 18 (12.8 per cent.) had one attack, while

46 (32.9 per cent.) had two, and 65 (46.5 per cent.) had three attacks. The thoroughly treated cases remained in the hospital on an average of 30 days, the others 36.8 days. The first injection should be given on the third day of the first apyrexia, and the second on the fifth day. Injections given on the fifth day of the first paroxysm are useless, and so also commencing the serum treatment in the second paroxysm. If the treatment has been begun in the first paroxysm it should be extended during the following apyrexia. Loeventhal (*Deut. med. Woch.*, Oct. 27, Nov. 3, '98).

Glandular Fever.—This is an infectious disease of children, having, as a rule, no prodromata, and characterized by slight redness of the throat, a marked febrile movement, and enlargement and tenderness of the lymphatic glands of the neck, especially those behind the sternocleido-mastoid muscles. The febrile movement is of short duration, but the glandular enlargement persists for a period varying from ten days to three weeks. (This disease should not be confounded with glanders or farcy, which is an entirely different disease.)

SYMPTOMS.—The onset is sudden, pain on moving the head and neck being the first noticeable symptom. There may be some abdominal pain, accompanied by nausea and vomiting. The temperature ranges from 101° to 103° F. The tonsils may be slightly congested and the lymphatic tissues swollen, but the throat symptoms are of slight importance and of short duration. The glandular enlargement appears on the second or third day, and while it lasts the glands may vary in size from a pea to a goose-egg. The glands are painful to touch or pressure, but there is rarely any redness or swelling of the skin covering them, though there may be, occasionally, some puffiness of the subcutaneous tissues of the neck and a slight difficulty in swal-

lowing. When the tracheal and bronchial glands are involved, as they may be, there may be a feeling of discomfort in the chest, with a spasmodic cough. The glandular swelling usually continues for two or three weeks. The complications reported in this disease are supuration of the swollen glands (Neumann has reported thirteen cases), hæmorrhagic nephritis, acute otitis media, and retropharyngeal abscess.

DIAGNOSIS.—The diagnosis of this disorder is easy, as the symptoms are characteristic.

ETIOLOGY AND PATHOLOGY.—Glandular fever may occur in epidemic form. West, of Bellaire, Ohio, describes an epidemic of 96 cases in children between the ages of seven and thirteen years. A marked feature in these cases was a bilateral swelling of the carotid lymph-glands. In three-fourths of the cases the post-cervical, inguinal, and axillary glands were involved. The mesenteric glands could be felt in 37 cases, the spleen was enlarged in 57, and the liver in 87 cases. There was no coryza and no bronchial or pulmonary symptoms. The cases occurred between the months of October and June. The nature of the infection is not known.

PROGNOSIS.—The prognosis of this disease is generally favorable. The complications mentioned above render the outlook more grave.

TREATMENT.—The treatment is mainly symptomatic.

Literature of '97-'98-'99.

The treatment of glandular fever is symptomatic. The use of small doses of calomel at the outset has, according to different observers, been of particular benefit. Small doses of salophen personally employed have seemed to relieve the pain and the general malaise. The administration of iron is necessary during

convalescence. Locally belladonna ointment in conjunction with lanolin may be employed. A. E. Roussel (*Med. and Surg. Reporter*, Apr. 17, '97).

Terminal Infections.—It may seem paradoxical, says Osler, but there is truth in the statement that persons rarely die of the disease with which they suffer. Secondary infections, or, in hospital parlance, terminal infections, carry off many of the incurable cases. Flexner, of Philadelphia (*Jour. Exp. Med.*, i, '96), has analyzed 255 cases of chronic cardiac and renal disease in which complete bacteriological examinations were made at autopsy. Excluding tuberculous infection, 213 gave positive and 42 negative results.

The infections may be general or local. The latter are very common and are found in a large percentage of all cases of chronic nephritis, arteriosclerosis, cardiac disease, hepatic cirrhosis, and other chronic disorders. The most frequent lesions are affections of the serous membranes (acute pleurisy, peritonitis, or pericarditis), meningitis, and endocarditis. Osler advances the opinion that it is perhaps safe to say that the majority of cases of advanced arteriosclerosis and of Bright's disease succumb to these intercurrent infections. Of the infective agents, Osler mentions the streptococcus pyogenes as perhaps the most common, but the pneumococcus, staphylococcus aureus, the bacillus proteus, the gonococcus, the gas bacillus, and the bacillus pyocyaneus are also met with.

In connection with the terminal form of acute miliary tuberculosis, Osler notes the great number of cases of arteriosclerosis of chronic heart disease, of Bright's disease, and especially of cirrhosis of the liver, in which death is determined by an acute tuberculosis of the peritoneum or pleura.

Flexner has found that the general ter-

minal infections are less common. Of 85 cases of chronic renal disease in which he found micro-organisms at autopsy, 38 exhibited general infections; of 48 cases of chronic cardiac disease, in 14 the distribution of bacteria was general. He found the blood-serum of persons suffering from advanced chronic disease to be less destructive to the staphylococcus aureus than normal human serum. Other diseases in which general terminal infection may occur are Hodgkin's disease (pseudoleukæmia), leukæmia, and chronic tuberculosis.

Finally, Osler observes that the terminal enterocolitis so frequently met with in chronic disorders is probably of the same nature.

Malta, Mediterranean, or Undulant Fever.—This disease, called by various names, is an endemic fever characterized by an irregular course, undulatory pyrexial relapses, profuse sweats, rheumatic pains, arthritis, and an enlarged spleen (Osler). The disease is met with at Malta, and in the countries bordering on the Mediterranean. In Gibraltar it is known as rock fever, and in Italy and Sicily as Neapolitan fever. It is probably also met with in India and China. Our knowledge of this disease is almost entirely owed to the labors and reports of Marston, Bruce, Hughes, Durham, and other army-surgeons stationed at Malta and Gibraltar.

SYMPTOMS.—The period of incubation is from six to ten days. "Clinically the fever has a peculiarly irregular temperature-curve, consisting of intermittent waves or undulations of pyrexia, of a distinctly-remittent character. These pyrexial waves, or undulations, last, as a rule, from one to three weeks, with an apyrexial interval, or period of temporary abatement of pyrexial intensity between, lasting for two or more days. In rare cases the remissions may become so

marked as to give an almost intermittent character to the febrile curve, clearly distinguishable, however, from the paroxysms of paludic infection. This pyrexial condition is usually much prolonged, having an uncertain duration, lasting for even six months or more. Unlike paludism, its course is not affected by the administration of quinine or arsenic. Its course is often irregular and even erratic in nature. This pyrexia is usually accompanied by obstinate constipation, progressive anæmia, and debility. It is often complicated with and followed by neuralgic symptoms referred to the peripheral or central nervous system, arthritic effusions, painful inflammatory conditions of certain fibrous structures, of a localized nature, or swelling of the testicles." (Hughes.)

Three distinct types of the disease are recognized by Hughes: A malignant type, in which the disease may prove fatal within a week or ten days; an undulatory type (the common form), in which the fever is marked by intermittent waves, or undulations, of variable length, separated by periods of apyrexia and absence of symptoms, the duration of this undulatory form being from three months (the average time) to two years, the patient suffering a series of relapses; finally, the intermittent type, in which the patient may have daily fever toward evening, without any special complications, and may do well and be able to go about his work, and yet, at any time, the other serious features of the disease may develop.

DIAGNOSIS.—This fever must be differentiated from typhoid fever and from malaria. A close study of the temperature-curve and the characteristic symptoms will facilitate the diagnosis. Moreover, the absence of specific action of quinine and arsenic and the absence of

the *Plasmodium malariae* in the blood distinguish it further from malaria.

ETIOLOGY.—This disease prevails in summer, and in infected sections is endemic, occasionally becoming epidemic. Lack of proper sanitation favors its spread. Hughes believes that the poison is conveyed in the air and is related to defective drainage, while Bruce believes that water is the carrier. Young, healthy adults are the chief victims of this disease; the disease is non-contagious. An organism called the micrococcus melitensis by Bruce, its discoverer, is present in all cases, having been found by him in large numbers in the spleen, but not as yet isolated from the blood. This organism is round or slightly oval in form, and measures, in dried preparations, about 0.33 micromillimetre in diameter. A magnifying power of from 1000 to 1500 diameters is required for its detection. Viewed in a drop of water, unstained, the microbes are seen as bright points in active molecular movement, the great majority of them single, a few in pairs, and sometimes in chains. They possess no power of spontaneous movement. They can readily be stained in a watery solution of gentian-violet, but they become decolorized by Gram's method. Alcohol at once removes all color from the micro-organisms, even after fixing them with osmic acid, corrosive sublimate, or tannic acid. In nutrient peptonized broth, kept at 98.6° F., no change is visible for the first few days, but after some time the fluid becomes decidedly cloudy without any formation of pellicle on the surface. The best culture-medium for this coccus is a 1.5-per-cent. peptonized agar-agar beef-jelly.

The character of the micrococcus melitensis has been investigated by H. E. Durham, who has found that inoculations into monkeys produce a disease similar to

that in man, and the micrococcus can be isolated from the infected animal. A characteristic serum-reaction is present. It is probable, from Durham's experiments upon animals, that the specific coccus may be isolated from the urine even after apparent recovery.

Literature of '97-'98-'99.

The micro-organism of Malta fever is about 5 microns in diameter, is non-motile, but shows Brownian movements. It conforms in its biological properties with the micro-organism described by Bruce, except the rapidity with which the colonies appeared after reinoculation. Agglutination appears to occur when, as a result of the oscillations, the micro-organisms come in contact, when they adhere and cease moving. The clumps are, therefore, much smaller than those observed in the case of the Widal reaction in typhoid fever. J. H. Musser and Joseph Sailer (Phila. Med. Jour., July 8, '99).

PATHOLOGY.—No characteristic morbid lesions have been discovered.

PROGNOSIS.—The mortality of this disease is low: only about 2 per cent. The gravity in this disease lies in its protracted course; in the British army stationed at the various Mediterranean ports the loss of time is a serious item.

TREATMENT.—The general measures suitable to the treatment of typhoid fever are recommended by Osler in this disorder: Fluid food during the febrile period and hydrotherapy, either the bath or cold pack, every third hour when the temperature is above 103° F.; otherwise the treatment is symptomatic, as no drug appears to have any specific action on the disease. Convalescence is, in many cases, hastened by a judicious change of climate.

Dengue.—Dengue (break-bone fever, dandy fever, bouquet, bucket-fever,

eruptive articular fever, eruptive rheumatic fever, dingee, denguis, etc.) is an acute infectious disease of tropical and subtropical regions, somewhat resembling remittent fever, but more severe. It is characterized by high fever; pain in the head, eyeballs, back, joints, and muscles; a catarrhal inflammation of those mucous surfaces that are exposed to the air; swollen glands; an initial erythematous and a terminal polymorphous eruption, and a tendency to be continued for several weeks by intermittent attacks of short duration. It derives the name "break-bone fever" from the severe character of the pain, and "dandy fever" from the stiff, dandified gait assumed by those affected with this disease.

SYMPTOMS.—After a period of incubation of from three to five days, during which the patient feels perfectly well, the attack begins suddenly with severe frontal headache, vertigo, a sense of chilliness or actual rigors, alternating with flushes of heat, dryness of the skin, aching in the eyeballs, and intense aching pains along the spine and in the limbs, but more particularly in the joints, which become red and swollen. The pulse becomes hard and rapid and the respirations are accelerated. There is a sensation of heat and pain at the epigastrium associated with furred tongue, loss of appetite, and very frequently nausea, intense muscular prostration, restlessness, and insomnia and slight delirium. The face is suffused and puffed, the eyes are red, and the mucous membranes congested. The skin is covered with an erythematous rash. Prostration steadily increases, the temperature rises gradually, reaching, not infrequently, 106° or 107° F.; the pulse rises to 120 or even 140; the tongue becomes coated, except at the tip, with a thick, white, moist fur; the pains become increased in severity, and tend to shift

about as in ordinary rheumatism; and the affected joints become more swollen. By the third or fourth day the fever has reached its maximum, profuse perspirations appear, the severity of the symptoms somewhat abate, and the patient feels prostrated and stiff. In a couple of days, or longer, a second paroxysm of fever appears; the pain returns; and an evanescent eruption, in many cases, appears, first on the hands and feet and later spreading all over the body. This polymorphous eruption is sometimes macular, like that of measles; sometimes diffuse, like scarlatina; it may resemble the eruption of urticaria or of lichen, or it may be vesicular in character. This eruption usually disappears on the second day, is attended with more or less itching, and is followed by desquamation. With the disappearance of the rash, on about the seventh or eighth day of the disease, the fever declines, the symptoms abate, and the patient becomes convalescent. In a short time, however, a relapse occurs, during which the symptoms are almost as severe as those of the primary attack, which lasts for two or three days; a second or third relapse may follow intervals of apparent convalescence. After the final cessation of the febrile attacks great debility, and, often, pain, stiffness, and swelling of the joints remain; and permanent convalescence is not finally established until the lapse of three months.

Other occasional symptoms have been noted: hyperæmia and inflammation of the mucous membranes of the mouth and respiratory tract; epistaxis; swelling of the parotids, with salivation; swelling of the lymphatic glands or of the testicles (which may persist for weeks after the fever has abated); jaundice, and ophthalmia. In some cases the appetite continues good throughout. Patients that are pregnant rarely abort. Complications

are rare. Convulsions sometimes have been observed in children. Hæmorrhage from the mucous membranes was noted by Rush. Black vomit has been observed by some writers.

In all but the mildest cases the crisis leaves the patient low and weak, with complete anorexia, a fœtid taste in the mouth, mental depression, and great muscular weakness. This condition may last for a week or ten days, and then gradually, or in some cases suddenly, disappear. The subsequent state of health is described by many as being distinctly above par.

Vertigo may be troublesome for some time; deafness is occasionally present; boils are common. Post-dengue dementia, recovering completely without treatment, is referred to by several; peripheral neuritis has been noticed; pleurisy and asthma follow occasionally. Chorea in a rather aggravated form has been noted. Chronic urticaria has also followed. F. E. Hare (*Australasian Med. Gaz.*, Mar. 21, '98).

DIAGNOSIS.—The symptoms of dengue resemble somewhat those of ague, scarlet fever, measles, and yellow and relapsing fevers. As the disease presents a distinct remission and is usually epidemic, the diagnosis from rheumatism is rarely difficult. The greatest difficulty, perhaps, is the differentiation of dengue from yellow fever, as they frequently co-exist in the Southern States and the tropics. Guitéras lays stress on three diagnostic points which he claims are pathognomonic of yellow fever: the facies, the albuminuria, and the slowing of the pulse, with maintenance or elevation of the fever. He also states that jaundice, which sometimes occurs in dengue, rarely appears as early as the second or third day of the disease, and on this much stress should be laid. Hæmorrhages are much less common in dengue, although they do occur, as recognized by Rush and others. The eruption of dengue and the

intensity of the arthritic inflammation may serve to distinguish it from relapsing fever.

Literature of '97-'98-'99.

The disease prevalent in the southern camps during the Spanish War, often diagnosed as malaria, was really dengue fever. As soon as the rains began (July 5), the fever began to spread rapidly, taking men in such order as to rule out the idea of contagion. It was an infectious disease, with an incubation-period of a day or so. It began suddenly with chills and intense occipital headache; pains in the bones and muscles; high fever (105° to 106° F.); mild delirium, insomnia, restlessness, and nightmares; occasionally there were petechiæ and blotchings of the skin. These for three or four days, then a rapid decline of the fever. After a few days more, sometimes symptoms of catarrhal jaundice would appear. The acute symptoms were over in a week, leaving the patients much prostrated and unnerved. The disease was never fatal. The rapid decline of the fever, the absence of the usual intestinal symptoms; of the usual characteristic stools, spots, and facies; the tendency of the disease to recur—all precluded the idea of typhoid in typical cases. There were undoubtedly cases of mixed infection, the typhoid appearing later. The fever was undoubtedly the dengue. W. T. B. Harland (*Phila. Med. Jour.*, June 24, '99).

ETIOLOGY.—McLaughlin, of Texas, has found a micrococcus in the blood of patients suffering with dengue which he believes to be the specific cause of the disease. The infection of this disease is more virulent and spreads more rapidly, if possible, than that of influenza; it attacks alike male and female, young and old, all classes indiscriminately. During the epidemic in Galveston in 1897, 20,000 people were attacked within two months. It prevails generally in the summer season, is favored by faulty hygienic conditions, and spreads along the lines of

travel by land and sea. It is believed by many to be contagious.

PATHOLOGY.—The lesions of this disease are practically unknown.

PROGNOSIS.—Dengue is rarely fatal. Notwithstanding the high fever, the severe pain, and the general gravity of the symptoms, those suffering from this disease rarely have delirium or fail to recover ultimately. Occasionally early in the disease, during the defervescence, death occurs from syncope. S. H. Dickson reported three deaths in the Charleston epidemic (1828).

TREATMENT.—The treatment of the disease is symptomatic. Quinine has been used as a prophylactic, but, according to Osler, on insufficient grounds. Salines, refrigerants, and hydrotherapy (cold pack or bath) may be employed against the fever. The headache and arthritic pains may sometimes be relieved by local applications and the use of the salicylates, phenacetin, or acetanilid; more often opium in some form is required. Later, when convalescence is established and the arthritic pains persist, great relief may follow the use of the iodides; quinine and other tonics are indicated throughout the period of convalescence.

Beyond general hygienic measures, such as rest in bed, a fluid diet, mild aperients, etc., there appears to be but little in the treatment of dengue. Exposure greatly increases the severity of the pains. All exertion, both physical and mental, is to be avoided.

Antipyrine relieves the headache in a remarkable manner, and also the other pains in a lesser degree. Antifebrin, phenacetin, and antikamnia act similarly, though more feebly. It is advisable to avoid large doses of antipyrine; for adults, 10 grains may be given whenever the symptoms are severe, but never more frequently than once in eight hours. The drug, however, should be avoided late on

the fourth day, as if given shortly before the crisis collapse might thereby be increased. Sulphonal has seemed to act well as an hypnotic.

Morphine subcutaneously is at times demanded by the severity of the pains, but it is apt to be followed by an exacerbation of the gastric symptoms.

For the retching and vomiting, which is so constant a symptom on the fourth and fifth days, nothing has been found effectual except emetics of warm water. The patient is directed to swallow rapidly a pint or more of warm water. This is immediately returned and the procedure repeated once or twice.

It is of the greatest importance to warn parents of the possibility of collapse, and to instruct them carefully in the management of this condition before it arises. It almost always occurs at the same period of the disease, viz.: about the end of the fourth day or the beginning of the fifth. The child should then be constantly watched, not being left for an instant, and the proper remedial measures taken on the first suspicion of a change. Hot stimulants are to be given by the mouth if possible, otherwise by the rectum, with beef-tea: external heat in all forms: mustard to the præcordia; hypodermic injections of strychnine and ether have generally been used. Wet packs or the bath have been tried in the hyperpyrexia which follows, but without benefit. F. E. Hare (*Australasian Med. Gaz.*, Mar. 21, '98).

Mountain-fever.—Osler observes that several distinct diseases have been described as mountain-fever: Mountain-anæmia, associated with anchylostoma, not yet met with in this country; certain cases of a fever occurring in mountainous regions of the Western States, which have been shown to be unmistakably typhoid fever, through the careful observations of Hoff, Smart, Woodruff, and Raymond, not only from the clinical features, but the Widal reaction as well. It would be well, says Osler, for the use of the term mountain-fever to be discontinued.

Literature of '97-'98-'99.

Mountain-fever is merely an atypical form of typhoid fever. The disease is characterized by malaise, headache, chill, and pains in the muscles and back. The tongue is coated, there is loss of appetite, and constipation. The characteristic roseolar eruption is frequently present, and there is often gurgling in the right iliac fossa. The temperature is that characteristic of typhoid fever, but occasionally there are irregularities during the convalescent stage. The pulse is usually rapid, dicrotic, and occasionally intermittent. Intestinal hæmorrhage is exceedingly rare. Stuver (*Med. News*, Nov. 4, '99).

C. SUMNER WITHERSTONE,
Philadelphia.

SPINAL CORD, DISEASES OF.

General Considerations.—The diseases of the spinal cord, including the various congenital and acquired deformities and anomalies of development, together with the primary or complicating affections of the meninges, are more than fifty in number. Of this list, however, more than half represent rare and sometimes exquisitely refined distinctions in type both clinically and pathologically, that are relatively unimportant to the general practitioner. Of the diseases that are common there are less than a dozen. Infantile spinal paralysis, myelitis, and locomotor ataxia constitute collectively probably three-fifths of the entire number.

Numerous attempts have been made to classify the diseases of the cord, but so far such attempts have been largely sterile in practical results. Our knowledge of the anatomy and localization of function as well as of the pathology of the cord is constantly undergoing modification, necessitating changes in opinion and in teaching. The old division into systemic and non-systemic affections still obtains, but its limitations are constantly relaxing and its advantages becoming

more and more problematical. Function is undoubtedly systemized, but contiguity as well as continuity is a factor in disease in the cord as elsewhere. The terms acute and chronic, inflammatory and degenerative, no longer represent clear-cut types, but are more likely to simply distinguish stages of progress in what is often the same affection. Sclerosis as distinguished from gliosis is probably—almost positively—not a primary condition, but may attend secondarily any acute lesion of the cord. It is equally true, however, that certain spinal-cord affections are inherently degenerative in tendency *ab initio*, the acute stage, if there be such, being clinically indefinable. In view of these facts I shall make no attempt to classify the diseases to be considered, an omission the more legitimate here since many of the diseases properly belonging in this article have been treated elsewhere. LOCOMOTOR ATAXIA has been, on account of its importance, described in a separate article; so also has multiple sclerosis and the forms of meningitis. Abscess of the cord is best studied in connection with caries of the vertebra, with which it is often associated. The vascular diseases of the cord—hæmorrhage, embolus, thrombus, and aneurism—are exceedingly rare, and this is true also of tumors, though perhaps less so. The spinal type of progressive muscular atrophy has been included among the diseases of the muscles. (See also CHRONIC POLIOMYELITIS.)

It is impossible to overestimate the essential importance of a knowledge, more or less complete, of the anatomy and physiology of the cord. The facts and theories of localization should also be familiar. The limits of this article, however, do not permit an elaborate consideration of this aspect of the subject.

NAME.	FUNCTION.	SYMPTOMS IN DISEASE OF.
1. Central canal.	Motor. Trophic. Sensory.	Atrophy. Paralysis. Anaesthesia. Analgesia. Loss of temperature.
2. Anterior horns.	Motor. Trophic. Reflex.	Flaccid paralysis. Atrophy. Lost reflexes.
3. Posterior horns.	Sensory.	Loss or impairment of all forms of sen- sation.
4. Anterior columns (Türk's).	Motor. Inhibitory.	Spastic paralysis. Contractures. Exag- gerated reflexes.
5. Crossed (lateral) pyramidal columns.	Motor. Inhibitory.	Spastic paralysis. Contractures. Exag- gerated reflexes.
6. Gowers's columns.	Sensory (pain and temperature?).	Hyperalgesia or analgesia. Loss of temperature sense.
7. Direct cerebellar columns.	Sensory (muscular?).	Ataxia.
8. Spitzka-Lissauer columns.	Sensory (tactile?).	Hyperaesthesia or anaesthesia. Trophic symptoms (?).
9. Burdach's columns.	Sensory (tactile pain; excito-reflex?).	Hyperaesthesia or anaesthesia and algesia. Lost reflex.
10. Goll's columns.	Sensory (muscular tact; pain?).	Ataxia. Hyperaesthesia or anaesthesia and algesia. Lost reflex.
11. Clarke's columns.	Sensory (same as Goll's?).	Ataxia. Hyperaesthesia or anaesthesia and algesia. Lost reflex.

The numbers opposite the names of the following diseases of the spinal cord represent the chief anatomical location of the morbid process in each disease:—

Poliomyelitis, 2.

Primary lateral sclerosis, 5 and 4.

Amyotrophic lateral sclerosis, 2, 5, and 4.

Locomotor ataxia, 8, 9, 10, 6, 7, 11, and 3.

Syringomyelia, 1 and any one or several others.

Ataxic paraplegia, 5, 7, 8, 9, and 10.

Progressive muscular spinal atrophy, 2.

Transverse myelitis complete, 1 to 11, inclusive.

Friedreich's ataxia, 4, 5, 7, 8, 9, 10, and sometimes 6.

Myelitis.

Synonyms.—Inflammation of the spinal cord; softening of the spinal cord.

Definition.—Myelitis is an inflammation, localized or general, with secondary softening or sclerosis of the spinal cord, with irritative and paralytic motor and sensory as well as special symptoms, varying in character and distribution with the localization and degree of the morbid process at different levels or areas of the cord. Many varieties are

recognized. The anatomical division includes the cervical, dorsal, and lumbar varieties; the transverse (imperfect or complete); the diffuse, or disseminated; the focal; the central; and the marginal. The last mentioned is frequently associated with and often dependent upon a meningitis, the resultant condition being known as meningomyelitis. The etiological division includes at least three varieties of importance: the traumatic, the syphilitic, and the tubercular. The terms acute, subacute, and chronic appear in the literature, although Strümpell and others dispute the existence of a primary chronic myelitis. The type of all forms is acute transverse myelitis.

Symptoms.—The disease may begin abruptly, subacutely, or very gradually. When the onset is abrupt a chill more or less severe may mark the introduction, followed by fever, the temperature ranging from 101° to 104°, occasionally higher. In children the onset may be attended with convulsions; aside from the general malaise and fever, the constitutional disturbance may be slight. The essential nervous symptoms are usually irritative at first, although motor

and sensory paralysis may be present from the start. These nervous symptoms vary widely with the locality and extent of the myelitic process. This variation in the symptom-picture, according to the locality affected, imperatively necessitates a certain degree of familiarity with the topographical anatomy and functional localization of the cord. The dorsal region is most frequently affected in the focal disease. Among the irritative symptoms hyperalgesia and hyperæsthesia are common. The patient may complain, sometimes emphatically, of pain in the back and legs. Quite often the sensation is that of a tired aching in the limbs, as from excessive fatigue. If up and walking about, the legs are lifted wearily and the patient refers to them as being weighted with lead. There is a subjective numbness, or various paræsthesiæ may be mentioned. The bladder is disturbed in function. There is retention, or the urine may dribble involuntarily. The bowels are usually obstinately constipated; less frequently there is incontinence of fæces. Sexual power is lost or there may be persistent priapism. A feeling as of a band or belt encircling the hips, the waist, or the chest may be present. This is the so-called *ceinture*, or girdle symptom, and is quite constant in myelitis. The level of the *ceinture* feeling is a guide to the level of the cord-lesion. If the disease is of the cervical cord, involving the origin of the brachial plexus, the arms will be affected. Pupillary changes are also frequently noted when the disease is of the cervical cord through implication of Budge's cilio-spinal centre. Should the myelitis extend upward the functions of the vagus are disturbed and dyspnœa, with circulatory and vasomotor symptoms, is added to the picture. Following the irritative come the paralytic symp-

toms. The hyperæsthesia is succeeded by anæsthesia, which is characteristically erratic in distribution, due to the destruction of some fibres and the escape of others. Any or all other forms of common sensation may be impaired or completely lost. There may be dissociation of sensation, though this symptom is not common. The motor weakness is succeeded by actual paralysis, which follows an anatomical distribution, but is usually not absolute. This paralysis may be flaccid or spastic, or first one and later the other, with abolished or exaggerated reflexes according to the location of the lesion. Wide-spread motor and sensory paralysis may follow slowly a prolonged irritative stage or it may be extensive and complete within a few hours or days after the onset of the disease. Within a few weeks or months atrophy of the muscle, sometimes slight, sometimes extreme, occurs. The electrical reactions may remain normal, although both quantitative and qualitative changes have been frequently noted. Bed-sores are exceedingly common in severe cases, and are sometimes an extremely vicious and dangerous symptom. In the spastic cases decided contractures may develop, the knees being flexed upon the abdomen, the heels touching the buttocks. Clonic or tonic spasms occurring in exquisitely painful paroxysms add to the sufferings of the patient in many instances. In the chronic variety of the disease the irritative symptoms are far less prominent. The mind remains unaffected in all cases except where an insanity may be super-added from pain and abject helplessness. It should be remembered, too, that the syphilis or tuberculosis or alcohol causing a myelitis may later attack the brain.

Diagnosis.—The acute disease may occasionally closely resemble Landry's paralysis. In the latter affection the sen-

sory symptoms are slight, usually there are no bladder or rectal symptoms, no girdle sensation, and the course of the disease is, as a rule, much more rapid. Spinal meningitis rarely exists alone, the cerebral meninges being usually simultaneously involved. In syphilitic or tubercular spinal pachymeningitis or leptomeningitis, the pain is usually much more conspicuous and the irritative spasms more decided. Usually, however, in both pachymeningitis and leptomeningitis due to these causes the cord itself is soon involved, and the differentiation is unimportant. Occasionally the symptom-picture in myelitis may suggest locomotor ataxia. The knee-jerks may be abolished or greatly diminished, the genital functions are involved, the sensory symptoms may be similar, Romberg's symptom may be present, and there may be an ataxic gait. The Argyll-Robertson pupil will be found wanting, however, as well as other ocular and optic-nerve changes; the pains are different in character and degree, and there is true motor paralysis in myelitis not present in tabes dorsalis. The history as regards mode of onset and rate of progress is of value in differentiating spinal muscular atrophy and amyotrophic lateral sclerosis and primary lateral sclerosis from myelitis. Tumor of the cord is almost invariably complicated with myelitis of focal type, and the symptoms are necessarily identical in great measure. It is possible, however, to determine the existence of tumor at times by the more intense and sometimes agonizing pain, the slower rate of progress, the narrower limitation of symptoms, and the lessened degree of constitutional disturbance. The presence of tumor elsewhere, especially if malignant, is often of assistance. Spinal hæmorrhage, if at all extensive, is usually quickly fatal from shock.

Etiology.—The disease may occur at

any age and in either sex, though it is most common in males between the ages of fifteen and forty years. Prolonged or severe exposure to cold and dampness is a frequent and potent etiological factor. Next in frequency and importance, perhaps, is trauma, including excessive physical effort or exertion. A relatively large number of cases are due to syphilis, which may act either directly and immediately or indirectly and remotely as the cause. Tuberculous myelitis is rare, though spinal meningitis due to tuberculosis with secondary complicating invasion of the cord is not uncommon. Occasionally myelitis occurs during or immediately following (*propter hoc*) the acute infectious diseases. Arsenic, lead, and other metallic poisons may induce the disease. Gross alcoholic excess is often a most important contributing factor and may occasionally prove the sole cause, although the brain and peripheral nerves are usually affected equally and simultaneously in such instances. In a very appreciable proportion of patients the etiology cannot be positively determined. This is especially true in subacute and chronic myelitis.

Pathology.—The morbid anatomy of myelitis varies with the cause of the disease somewhat and to a still greater degree with the stage during which death occurs. In patients dying during the acute stages the appearance of the cord in the areas affected is that of an acute inflammatory process. The blood-vessels are engorged and increased in number. Minute punctiform or capillary hæmorrhages are sometimes present. The cells are swollen and the nuclei distorted or displaced. These changes are followed by an increase of connective tissue, with destruction of the nerve-cells and nerve-fibres. The cord may be discolored and swollen in appearance on gross inspection.

tion or it may appear shrunken. Later the vessel-walls become thickened; the nerve-tissue is more or less completely displaced by connective tissue; the cells disappear and are replaced by granular and amorphous material. The pia and even the dura may be involved. In some instances, especially those due to syphilis, the entire cord for several inches may be so softened as to be diffuent. The nerves may participate secondarily in the degenerative process.

Prognosis.—This varies widely in individual instances, the variation being dependent chiefly upon the etiology, although the severity of symptoms is also a factor. Myelitis due to causes which are removable by surgical procedure—as, for example, compression from trauma, tumor, or vertebral disease—may occasionally be completely cured. Syphilitic myelitis offers a distinctly better prognosis than the non-syphilitic, although even here an opinion as to the outcome should always be extremely guarded and never positive at first, especially as regards permanent disability. Immediate danger as regards life is greatest in myelitis due to or following the infectious fevers, sepsis, and severe injury. The duration of the disease is equally indefinite; a subacute myelitis may pass into a chronic, slowly progressive form, the gradual development of symptoms extending over a period of many months or years. The inflammation may subside after a varying length of time and be followed by a necrosis or sclerosis which is limited by the preceding inflammation, the patient being left with a paralysis which remains permanently stationary. The process may stop and remain stationary for some time and then start up again, some slight additional cause relighting the fire in a locality predisposed by previous disease. The severity of the

trophic symptoms is quite reliable as a guide in determining the immediate danger to life, deep and extensive bed-sores being invariably of ill omen. Severe bladder symptoms are also of evil significance.

Treatment.—Absolute rest in bed is essential in all cases; at first counter-irritation should be employed, with extreme caution, however, on account of the danger of inducing bed-sores. A water-bed is often advisable from the first to prevent this complication. The catheter should be employed also with extreme antiseptic and mechanical precaution. Pain should be relieved by opiates when necessary, but in minimum doses. The details of treatment vary with the cause. In syphilitic myelitis no time should be lost; the patient should be put at once upon full and rapidly increasing doses of potassium iodide. The dose to begin should be at least 25 drops of the saturated solution. The salt should be pure and the vehicle should be changed every few days—water, milk, Vichy, Apollinaris, Geisshübler water, or plain carbonated water may be employed in turn. The dose should be progressively diluted more and more, as it is increased. Should iodism develop, double the dose if less than 40 drops or grains; if over 100, reduce it one-half and rapidly increase to a dose beyond that at which iodism occurred. The maximum daily amount is to be determined by the effect on the disease, but it is rarely necessary to give more than 600 or 800 grains daily. Mercury is superior to the iodide only when primary syphilis has immediately or at least recently preceded the myelitis. When the disease results from trauma or is due to tumor, abscess, or disease of the vertebra, the question of operative interference should always be considered and decided promptly in order to pre-

vent extension and secondary softening. Symptomatic relief may often be obtained by appropriate operative procedure, and this is true even in tuberculous myelitis, where lumbar puncture with drainage at times greatly alleviates the patient's distress. In myelitis due to infection there is no specific drug or plan of treatment. Sodii salicylatis, small doses of mercury, or full doses of iron may be given in addition to the familiar local measures during the acute stage.

For the chronic disease we may expect a certain amount of benefit from galvanism and massage. The details of the electrical treatment will vary with the locality affected (see POLIOMYELITIS). Silver, arsenic, gold, phosphorus, and ergot are all mentioned as therapeutic resources, but there is little, if any, evidence of specific benefit from either. A tentative course of treatment with potassium iodide should be given in all chronic cases.

Poliomyelitis.

Synonyms. — Infantile spinal paralysis; myelitis of the anterior horns; acute atrophic paralysis; essential paralysis of children; West's morning paralysis.

Definition. — A purely motor paralysis of flaccid type, occurring usually in young children, the paralysis being followed by rapidly developing atrophy, with degenerative electrical reactions in the affected muscles. An *acute*, a *subacute*, and a *chronic* form are recognized, the last being the variety commonly observed in adults.

Symptoms. — An attack of acute infantile spinal paralysis is, as a rule, unattended with prodromata. The disease begins abruptly, usually with some fever, the essential significance of which is rarely understood at this stage. The temperature may be only slightly elevated (1 to 3 degrees), the range being higher and

the fever more prolonged, the older the child. There may be slight digestive disorders,—such as vomiting and diarrhoea,—slight headache, and in some instances the patient may complain of pain in the back and limbs. These general symptoms vary in intensity with the temperature. In about one-fourth of all cases the onset of the disease may be marked by a convulsive seizure. The younger the patient and the higher the temperature, the more likelihood is there of convulsions, which, however, are rarely repeated more than once or twice. After a few days—usually two or three, rarely more than ten—the fever and general disturbance subside, and not until then, usually, is the true nature of the illness made evident by the discovery of a flaccid motor paralysis, which may at first affect all of the extremities as well as the trunk-muscles. If suspected and sought for, however, the paralysis may often be detected during the febrile stage. Within a week or two the general paralysis clears away, leaving a residual paralysis limited to one or more limbs, or, it may be, to a single muscle or group of muscles. Such groups are invariably of muscles of associated function. The lower limbs are rather more frequently affected than the arms. A paraplegic distribution is common, a hemiplegic distribution exceedingly rare.

In perhaps one-fourth of all cases among children the onset is even more abrupt than as described. The child may be put to bed in apparent good health, sleep quietly or perhaps a little restlessly through the night, and is found the following morning bright, cheerful, and with a hearty appetite, but paralyzed in one limb, or, it may be, with a paraplegia, the affected limb hanging helpless and inert. Such cases were described in the older literature as West's morning paralysis.

There is no sensory disturbance in poliomyelitis, or, if present at all, it amounts only to a slight tenderness on pressure or manipulation. The hyperæsthesia of meningitis is extremely uncommon, and suggests a complication. The bladder and rectum are not involved, the cranial nerves remain normal, nor is intelligence at all affected. Within two weeks usually, sometimes much earlier, the muscles paralyzed begin to atrophy. The wasting sometimes progresses rapidly. If the child is fat, this atrophy may not be apparent to the eye, but palpation will at once make it evident. Not only does the limb look wasted, but it usually presents a bluish, cyanosed appearance, and to the touch of the examiner it is distinctly colder than its fellow. The deep reflexes are lost, if affected at all. Care and familiarity with the subject are both needed to avoid misleading conclusions in eliciting this symptom. Simultaneously with the atrophy, or it may be a little later, an alteration both quantitative and qualitative may be noted in the response to both the faradic and galvanic currents. To the faradic current the muscular response is at first simply diminished. It grows more and more feeble from day to day, and is eventually lost completely in severe cases. To the galvanic current the nerves involved show at first beginning and later more or less complete reaction of degeneration. In making these electrical tests the corresponding sound muscles in the unaffected limb should be examined and the response compared with that obtained from the paralyzed muscles. Minor changes can only be determined in this way. Within a few months various deformities from contraction and unopposed muscular antagonism may develop. Talipes varus and equinus and many other deformities are possible. Sometimes an

arrest of development occurs, one limb after a few years being shorter than the other or one hand or foot smaller than the other. Chronic poliomyelitis is one of the forms of progressive muscular atrophy and, together with the subacute variety, differs chiefly in the mode of onset and rate of progress, but not in the essential nature of the established paralysis.

Diagnosis.—Although less than 5 per cent. of the cases are correctly interpreted during the acute or febrile stage, the history of this stage is of importance in the differential diagnosis, especially in excluding cerebral meningitis and the cerebral palsies of childhood. In poliomyelitis there are few irritative symptoms such as pain and spasm. One or two convulsions may occur, but the habit is not established and the patient does not develop epilepsy or mental enfeeblement. Epilepsy, on the other hand, is often a part of the symptom-picture in the cerebral palsies and mental impairment in some degree almost invariably present. The type of the paralysis in the two is exactly opposite. In poliomyelitis the paralysis is flaccid, the reflexes are lost, the muscles atrophy, the muscles affected are functionally associated, and a monoplegia is the rule as regards distribution. In the cerebral palsies the paralysis is spastic in type, with exaggerated reflexes; no wasting, although arrest of development may result; the paralysis is of muscles anatomically associated; the distribution is usually hemiplegic, monoplegias being rare. In cerebral palsies, too, the cranial nerves, particularly the facial, are often affected and the mind is almost invariably impaired, which is never true of infantile spinal paralysis. Finally, there are no electrical changes characteristic of the cerebral palsies. From other forms of myelitis infantile spinal paralysis is

to be distinguished chiefly by the absence in the latter affection of sensory symptoms, of sphincter involvement, of bed-sores, of spastic or semispastic phenomena. Palsies from peripheral neuritis due to trauma, including so-called birth-palsies caused by obstetrical forceps or injury in delivery, are often difficult to distinguish from poliomyelitis. The history of injury to the arm or shoulder and the anatomical distribution of the paralysis are points of differential value. In neuritis of this type sensory disturbances are not conspicuous, as a rule, but may be present. The history as to mode of onset and progress serves to distinguish poliomyelitis anterior acuta from the pure muscular atrophies.

Etiology.—Ninety per cent. of the acute cases occur within the first decade of life and more than half of all cases within the first three years of life. Among children the two sexes seem about equally susceptible. Among adults it is comparatively rare in the female. The disease is no respecter of cast or class, nor does it manifest any special racial proclivities, though the negro is comparatively exempt and the disease is more common in centres of dense population than in rural districts. Poliomyelitis is often a sequel to the febrile infections of childhood, especially scarlet fever, measles, and diphtheria. In this respect, as well as others, its etiology is quite similar to that of epidemic and sporadic cerebro-spinal meningitis. Poliomyelitis may also occur as an epidemic, many such having been reported, though no specific micro-organism has as yet been demonstrated.

Literature of '97-'98-'99.

Poliomyelitis anterior acuta is believed to be of an infectious or an infectio-toxic nature. This view is based on the numerous experiments in which the dis-

case has been produced in animals by the injection of different bacteria and their toxins. There is, perhaps, a secondary inflammation due to a primary focus situated in the intestine or elsewhere. Bülow-Hansen and F. Harbitz (Norsk Mag. for Laeg., Nov., '98).

In not a few instances trauma appears as the exciting cause; exposure to extreme cold or to excessive or violent exercise may induce the disease. The season has its influence, many more cases occurring in summer than in winter. This is especially noticeable in seasons of prolonged excessive heat. Among adults violent exercise, exposure, trauma, debilitating excesses, and syphilis are recognized as potent factors. Heredity is extremely rare.

Pathology.—The essential lesion in acute anterior poliomyelitis is an atrophic destruction, more or less complete, of the larger ganglion-cells (giant cells) of the anterior horns. This destruction of the cells of the anterior horns occurs as the result of an inflammatory myelitic process limited to the anterior gray matter, established through some, as yet undetermined, micro-organism in many instances, but probably not in all, the medium of invasion being the branches of the anterior spinal artery. The cells of the lower dorsal and midcervical segments are most frequently affected. The anterior nerve-roots are also affected secondarily with degenerative changes, and this is true of the muscles to which the affected nerves are distributed. The atrophied muscles show a distinct diminution in the size and number of fibres, the normal tissue being replaced by fat and connective tissue.

Prognosis.—It is of some interest to know or to approximate during the acute febrile stage the extent or degree and the distribution of the final more or less permanent paralysis. There is no positive

guide, but the severity of the constitutional disturbance, including temperature, is sometimes an index. Occasionally after the constitutional disturbance subsides, the loss of power may remain rather widely distributed. In such instances the electrical response affords information to the experienced examiner. If the quantitative response grows less or the qualitative change greater from day to day in certain muscles or a limb, just in proportion is there likely to be a permanent residual paralysis in such muscles or limb or *vice versa*. In all cases some permanent paralysis will remain, but it may be six months from the onset before the limits of this paralysis can be determined. The patient is handicapped physically in after-life to a greater or less extent, but never mentally. The prognosis depends largely upon the ability of the parent to carry out instructions in faithful, patient, persistent treatment.

Treatment.—During the febrile stage the treatment is that for all forms of acute myelitis, including absolute quiet and rest, ice-bags or counter-irritation to the spine, laxatives, and a non-stimulating, easily digested diet. To these measures should be added, if there is much fever, antipyretics, such as phenacetin or other coal-tar derivatives. It is customary to use ergot in $\frac{1}{2}$ -drachm doses or less, with or without bromide of potassium, and no harm is likely to follow its employment. The salicylate of soda has been employed with some advantage in epidemics of the disease, and its use seems rational. Usually this stage is treated symptomatically, for the reason that a diagnosis is rarely made so early. For the permanent residual paralysis our most reliable therapeutic resources consist of electricity, massage, and exercise of the parts through the assistance of

various mechanical appliances to be appropriately devised by the orthopædist. Both currents should be employed. In using galvanism one electrode, a large flat pad, should be placed over the spine at the level affected, the other on the limb paralyzed. Not more than 3 to 5 milliamperes should be used at first. As the child becomes accustomed to it, the current-strength may be gradually increased. The *séance* should last twenty minutes daily, and should be followed by an application of the faradic current to the limb itself. The current here should be strong enough to produce gentle contractions. If there is no response to faradism except with painfully strong currents, the interrupted galvanic current may be used in the same way. As much as possible of the affected muscle should be included in the circuit.

Massage should be given, preferably by one qualified for the work, though, if an expert be not available, simple rubbing is of at least some service in stimulating the circulation and local nutrition. Strychnine internally is at times of apparent value. The amount should vary with the age, of course, but much larger doses than are ordinarily prescribed are indicated. Such large doses may be quite safely reached by a gradual increase. Splints, braces, and other appliances serve a useful purpose in preventing crippling contractions and unsightly deformities. A flaccid leg may be supported by a brace so as to become useful in walking, which in itself is a valuable therapeutic aid. Velocipedes, tricycles, and other similar machines are often of much service.

Amyotrophic Lateral Sclerosis.

Definition.—Amyotrophic lateral sclerosis is a disease characterized essentially by the two symptoms of spastic rigidity and muscular atrophy.

Symptoms.—The clinical history of the disease is quite constant. It begins very insidiously, and its progress is slow at first. Usually the earliest symptoms are referable to the disease in the anterior horns, and are similar in character to those which mark the beginning of progressive spinal muscular atrophy: wasting of the thenar and hypothenar muscles, of the interossei or of the muscles of the arms or legs, almost always symmetrically, with or without tremor, which is rarely fibrillary, however. The degree of wasting may at first be so slight as not to attract attention or it may be readily mistaken at this stage for some form of progressive muscular atrophy. Within a few weeks or months, or, it may be, simultaneously, a sense of unusual fatigue upon exertion, with muscular stiffness and increasing difficulty in walking or in using the arms, due to the developing spastic rigidity, is noted, and the patient seeks advice. On examination, in addition to the atrophy, which is often more perceptible to touch than to vision, the limbs will be found more or less rigid and resistant to passive motion, giving the examiner a sensation as of bending a lead pipe. The knee-jerks and other deep reflexes will be found markedly exaggerated, and often early in the disease, and always in the well-established disease, ankle-clonus and wrist-clonus are readily elicited. If the bulbar nuclei are involved, there may be wasting of the muscles of the face, with alteration in the expression and impairment of function as regards speech, respiration, deglutition, and cardiac action. A symptom of importance is the altered electrical reaction to both the faradic and galvanic currents. The muscles respond more and more feebly to faradism the more advanced the disease. The qualitative changes with the galvanic current

are present early, and it is not uncommon to find decided alteration of the normal polar formula, with reaction of degeneration within a few weeks or months. In the late stages of the disease the atrophic symptoms may dominate the picture, the rigidity disappears, the reflexes are lost, and the victim is reduced to a state of bedridden helplessness, but with unimpaired intelligence.

Diagnosis.—The diagnosis is a matter of no difficulty ordinarily. The picture is that of primary lateral sclerosis and progressive spinal muscular atrophy combined. From other forms of myelitis and sclerosis presenting one or both of these symptoms, this disease is distinguished by the absence of sensory symptoms and of sphincter involvement. It is true that sensory symptoms have been occasionally noted in this disease, but such instances represent complicated and atypical examples, and have a different pathology.

Etiology.—It is not at all a common affection, is seen oftenest during middle adult life, and affects males chiefly. The etiology is not definitely understood, although traumatism, exposure to extreme cold, and excessive physical exertion, if prolonged, are probable auxiliary factors etiologically.

Pathology.—The pathology, on the contrary, is unusually well defined and constant. In the spinal cord the lesions are found in the anterior horns and in the lateral and anterior pyramidal columns. In the anterior horns the lesions are practically identical with those observed in chronic poliomyelitis. The so-called giant cells are either atrophied or destroyed altogether. In the motor tracts, both lateral and anterior, there is in all cases a well-marked sclerosis of these fibres, extending throughout their entire length, often into and beyond the pons

and occasionally even to the subcortical motor fibres of the Rolandic area itself. If the ponto-bulbar region is involved in the disease process, the motor nuclei are affected with degenerative atrophy exactly as are the cells of the anterior cornua. The peripheral nerves also undergo degeneration, which is of the parenchymatous type. In the muscles the essential fibres are replaced by connective tissue and fat, the alteration in color and consistency being often readily apparent upon quite superficial infection.

Literature of '97-'98-'99.

In a microscopical examination of the brain and cord of a case of amyotrophic lateral sclerosis, many of the cells of the anterior cornua showed more or less pronounced degenerative changes, but few of them were completely degenerated. The anterior spinal roots showed only moderate atrophy. Both pyramidal tracts were markedly degenerated, and there was an area of slight degeneration in the column of Goll. The motor nuclei in the medulla were apparently normal. Some amyloid bodies were found beneath the fourth ventricle, and in the spinal cord. Very peculiar bodies were found in the medulla about the vessels, which appear to have been colloid in nature. The giant-cells of the paracentral lobule were normal in appearance, but diminished in number. No traces of nerve-degeneration were found in the paracentral lobule, nor in the internal capsule stained by Marchi's method, nor in the pons in the cerebro-peduncles, nor in the capsule by Weigert's method. Degeneration was found in one of the laryngeal muscles. The fact that bulbar symptoms existed without marked degeneration in the motor nuclei, is explained by supposing that the central neurons above this level were degenerated, and gave rise to the symptoms. F. X. Dercum and W. G. Spiller (*Jour. Nerv. and Mental Dis.*, Feb., '99).

Prognosis.—The prognosis is hopeless as regards cure so far as precedent is a

guide. Early helplessness is the rule, and death occurs within a few years, though a fatal termination may be delayed by an induced or spontaneous remission or arrest of progress, rendering the disease stationary for many months.

Treatment.—In the absence of any plan of treatment known to be effective as a means of cure, our efforts are limited by experience to purely palliative measures. Among these, rest, massage, electricity, and hydrotherapy are all of value. The victims of this disease should be considered legitimate subjects for therapeutic experiment.

Primary Lateral Sclerosis.

Synonyms.—Spastic spinal paralysis; spastic paraplegia.

Definition.—It is a disease of gradual progressive onset assumed to be dependent upon a primary sclerotic affection of the lateral pyramidal tracts or columns, with symptoms of motor paralysis of spastic type, exaggerated reflexes, clonus, and contractures.

Symptoms.—Spastic spinal paralysis is always of gradual onset. It may begin as a stiffness in walking or in using the arms which gradually increases and suggests a condition of tonic spasm. The essential symptom in the developed disease is one of spastic contracture of the muscles of the extremities, particularly the flexors. The symptoms are most objectively conspicuous in the lower limbs, and in walking the gait is strikingly peculiar and almost pathognomonic, consisting of short, jerky, spasmodic, dragging steps, the patient being tilted forward on tip-toe. The act of walking will sometimes induce a clonus causing a series of heel-taps as the foot drags along the floor. Clonus is nearly always present in decided degree, and the deep reflexes—knee, wrist, ankle, elbow, and jaw—are invariably greatly exaggerated. There

are no sensory or trophic symptoms, nor are the intracranial nerves or functions involved; but the bladder is often disturbed, the patient exhibiting what Seguin has termed "hasty micturition." Sexual function may be indirectly lost.

Diagnosis.—The diagnosis is ordinarily a matter of no great difficulty, for, notwithstanding the vagueness of its pathology, the clinical picture is very constant and striking. Secondary lateral sclerosis from intracranial or basilar lesions is confusing only when such lesions are bilateral, and the presence in such cases of cranial-nerve involvement and of mental impairment will at once exclude the primary type. In myelitis with spastic contractures, the presence, in addition, of sensory symptoms, atrophy, rectal and vesical paralysis, with bed-sores and other trophic lesions, will readily differentiate. In disseminated sclerosis the patient may exhibit a typical spastic gait, with contractures and exaggerated reflexes, but the additional symptoms of intention tremor, nystagmus, scanning speech, oculomotor palsies, and sensory disturbances are peculiar, in their associated presence, to multiple sclerosis alone. In amyotrophic lateral sclerosis the marked and early atrophy is a distinguishing symptom. In progressive spastic ataxia, or ataxic paraplegia, the inco-ordination is sufficient to exclude the disease under consideration. In all cases, in view of the exceedingly inconstant pathology, a diagnosis of primary lateral sclerosis should be entertained only after most rigid exclusion of every other possibility and particularly disseminated sclerosis in an anomalous or atypical form.

Etiology.—The disease affects adult males chiefly, and the decade between 25 and 35 is the period of onset in the majority of instances. It is not very com-

mon, and its etiology is not at all definitely known, but is probably related to that of ordinary chronic myelitis.

Pathology.—The pathological evidence in support of the assumption that a primary sclerosis of the lateral columns exists is so slight and indefinite as to have led to much skepticism and, indeed, to downright denial. The morbid changes found post-mortem have been strikingly inconstant. Tumor, hydro-myelus, pachymeningitis, transverse myelitis, syringomyelitis, hydrocephalus, and several times disseminated sclerosis are among the many lesions which have been observed.

Prognosis.—The disease may last many years, the general health remaining quite good. Recoveries are unknown. The victim of the disease is sooner or later incapacitated for any and all forms of physical labor, though he may be able to employ the hands and arms after walking shall have become impossible. The mind is not affected.

Treatment.—The treatment is largely limited to symptomatic relief, experience having proved that but little may be hoped from measures directed toward a cure. Prolonged rest is of the first importance, and will at times result in decided amelioration of symptoms. The motor depressants—hyosine, atropine, and conium—have all been successfully employed for the temporary relief of the spasticity. Hydrotherapy also serves effectually the same purpose.

Landry's Paralysis.

Synonym.—Acute ascending paralysis.

Definition.—Landry's paralysis is a rapidly progressive motor paralysis of flaccid type, beginning in the extremities, usually the legs, extending thence upward through the trunk to the arms, and frequently to the nerves which have their origin in the lower pons-medulla

region. In some instances the disease may begin above and progressively descend.

Symptoms.—The disease begins with a feeling of extreme weakness, occasionally associated with paræsthesiæ, especially numbness, in the legs. This is progressive, and in a few days or even hours there is complete motor paralysis of the lower limbs. Quite often the onset is attended with slight or, it may be in rare instances, decided elevation of temperature. Paralysis of the trunk-muscles follows, the sphincters escaping; and finally the muscles of respiration and deglutition are involved, such involvement usually terminating the disease fatally. This order of invasion and progress is, in rare instances, reversed. The motor cranial nerves have been said to have been affected in one or two reported examples of the disease. Minor sensory changes, particularly hyperalgesia or anæsthesia, are not uncommon, though rarely conspicuous. The deep reflexes always, the superficial reflexes occasionally, are abolished. The mental faculties are, as a rule, normal, though a muttering semidelirium is sometimes observed. Bed-sores or other trophic symptoms are rare accidents, though atrophy of the muscles with altered electrical reactions may appear in protracted cases. In the typical disease the cycle is completed in from ten to fifteen days.

Diagnosis.—The diagnosis is quite free from difficulties, as a rule, if the doctrine of an identity with multiple neuritis be accepted. *Per contra*, the rejection of this theory renders the diagnosis between the two often a very complex problem. From fulminant forms of transverse myelitis it is to be distinguished by the involvement of bladder and rectum and the more decided sensory disturbances in the latter affection. In myelitis, too, the

deep reflexes are often exaggerated, there is the cincture symptom, trophic symptoms are of early onset and vicious progress, and the duration of acute myelitis even when most malignant is usually more protracted. The acute vascular lesions of the cord—particularly hæmorrhage, if properly localized—may closely simulate symptomatically the disease under discussion. The history of trauma, the apoplectic onset, often with convulsions, and the rapidly fatal termination are data of value in excluding Landry's paralysis.

Literature of '97-'98-'99.

1. There is a form of ascending flaccid paralysis, with little disturbance of sensation, with normal electrical reactions, and without involvement of the sphincters, and this is of rapid course, usually terminating in death.

2. Other cases differ from this type by one or more atypical signs, and transitional forms occur, which make the diagnosis between Landry's paralysis, polyneuritis, and myelitis difficult.

3. It is possible that in some cases no lesions exist, but many of the reports of such cases date from the time when the methods of examination were very imperfect, or it may be that in these cases the lesions are in an early stage of development, the patient succumbing to toxæmia before demonstrable changes in the nervous system take place.

4. Landry's paralysis may be due to myelitis alone.

5. In Landry's paralysis polyneuritis may be present, but changes in the cell-bodies of the anterior horns will also usually be found in such cases by Nissl's stain, and it is sometimes difficult to say whether the cellular changes are primary or secondary.

6. It is probable, in some cases at least, that the entire peripheral motor neuron is attacked at the same time by the poison of the disease. Mills and Spiller (*Jour. of Nerv. and Mental Dis.*, June, '98).

Etiology.—It is a disease of early or middle adult life affecting males chiefly. It is not very common. The etiology is not clearly understood, but there is a growing unanimity of opinion to the effect that the disease is due to a toxic infection, the specific nature of which, however, is as yet undetermined. It occasionally follows the infectious fevers. In at least one case seen by the writer, which presented a classical symptom-picture and ended fatally on the eleventh day, gross alcoholism was the cause. Neither climate nor season is known to be etiologically important, nor is heredity a factor.

Literature of '97-'98-'99.

Landry's paralysis is nothing but the second and third stages of a chronic multiple neuritis that affects the cord by continuity. Here it spreads rapidly, generally upward, sometimes downward, causing death by involvement of the vital centres of the medulla. The outbreak usually follows an attack of some infectious disease. Clinically the progressive character of the paralysis is characteristic; the direction of its spread, however, is not. Pathologically, Landry's paralysis is a subacute chronic polyneuritis and an acute diffuse degenerative myelitis. Krewer (*Zeit. f. klin. Med.*, B. 32, '97).

Pathology.—The pathology is as yet an unsolved problem, though the solution seems happily not far distant. The results of many autopsies in the past have been negative. Inconstant and widely varying lesions were reported or no determinable lesions whatever could be found, the latter result being the rule until within recent years. The theory of a profound and fulminant molecular disorganization of the anterior-horn motor cell is less than plausible, even as a theory. The doctrine of an identity with poliomyelitis, differing in the acuteness

and severity of form only, has been entertained and is based upon much quasi-supportive evidence. That the disease is a pure form of fulminant myelitis is no longer accepted, although it is admitted that the resultant symptom-picture may closely simulate Landry's paralysis. The consensus of present-day neurological belief is that the disease is quite probably a special form of multiple neuritis affecting the lower motor neurons, with secondary changes in the anterior horns and muscles resembling or identical with those observed in poliomyelitis. Ross, Pitres and Vaillard, Eisenlohr, Nauwerk, and many others are among those who have adduced evidence in support of this theory. Pending the final decision and following a well-established precedent, the disease is considered here among the affections of the spinal cord.

Prognosis.—The prognosis is grave always, but the disease is by no means necessarily fatal. Many recoveries have been reported. Should the disease not terminate fatally within two or three weeks the patient will probably recover. In those who recover there is no residual paralysis, the functions of the affected nerves being usually restored to the normal. A special susceptibility to subsequent attack is said to remain, but the statement lacks verification in general experience. The danger to life is, of course, far greater in those in whom the functions of cardiac action and respiration are affected; but even in such cases recoveries are said to have occurred.

Treatment.—The treatment, as might be inferred from the indefinite etiology, is more or less empirical. The patient should be put to bed at once and kept absolutely quiet. The limbs should be enveloped in lambs' wool fleece or the hot wet pack. Ergot in $\frac{1}{2}$ - or 1-drachm doses every four hours has been em-

ployed. Quinine in full doses with or without sodii salicyl. may be used. Small and frequently-repeated doses of mercury or inunctions of mercury are indicated. In plethoric subjects moderate venesection followed by warm saline transfusion suggests itself as a rational procedure. Serum-therapy may prove an aid ultimately. For the late stages of the protracted disease potassium iodide, strychnine, and electricity are indicated. Oxygen has been employed with symptomatic relief in the dyspnoea from respiratory involvement.

Hereditary Ataxia.

Synonyms.—Friedreich's ataxia, or disease; family ataxia.

Definition.—It is a distinctly, though not necessarily a directly, hereditary degenerative disease of the spinal cord, affecting the posterior and lateral columns and the bulbar region, usually beginning in childhood, with symptoms of ataxia, curvature of the spine, defects of speech, talipes, choreiform movements, vertigo, and ultimately paraplegia.

Symptoms.—In very young children the beginning of the disease, or at least the first symptoms, may not be recognized, but may be interpreted simply as indications of slow development or unusual awkwardness. The child does not learn to walk readily; it stumbles and falls easily or staggers in attempting to stand or walk. The hands are used clumsily and co-ordination appears to be learned with unusual difficulty. In speaking, the child drawls its words. The development of nystagmus, of curvature, or of talipes in some form may prove the first obvious and unmistakable evidence that more than a simple delay in development exists. The disease is much more readily recognized when the symptoms develop later in life, as at eight or ten years of age. Contrast with a previously normal

standard renders the symptom-picture much more conspicuous.

The gradually or rapidly increasing ataxia of gait and station; the choreiform ataxia in using the hands; the slow, drawling, thickened or scanning speech; the nystagmus; the club-foot; the curvature of the spine, and the paraplegia are pathognomonic when conjointly associated in early life in two or more members of the same family. Weakness in the legs is present early with the ataxia, and ultimately becomes a more or less complete paraplegia. Sensory symptoms are rare, though, subjectively, headache and slight aching or pains in the limbs may be present. Vertigo is not uncommon. The sphincters are not involved until late in the disease. The knee-jerks are lost, as a rule. Atrophy of muscles and trophic lesions of the skin are exceedingly uncommon except late in the advanced disease. The electrical reactions are usually undisturbed. In a very few cases paresis of the eye-muscles has been noted. Usually some degree of impairment mentally is present in the established disease.

Diagnosis.—There are only two diseases which are likely to confuse the diagnosis: disseminated sclerosis and Huntington's chorea. In the latter the disease occurs in middle life or later, as a rule; the mental faculties are more markedly involved; the choreiform movements are far more active and extreme; the speech is jerky or explosive; and there is no curvature, no talipes, and usually no nystagmus. From multiple sclerosis the distinction is sometimes impossible. The family history as to direct heredity is of value, but the fact that a brother or sister is similarly affected is less valuable since Dreschfeld and others have reported multiple sclerosis in two members of the same family. The cra-

nial nerves are more frequently affected in disseminated sclerosis: the knee-jerks are often exaggerated; disturbances of sensation are much more common, which is true also of sphincteric involvement. The tremor when present in Friedreich's ataxia is less of the intention type and more like that of chorea. Convulsions and crises, when present, point to multiple sclerosis rather than Friedreich's disease. Remissions do not occur in the latter, while they are not at all uncommon in the former.

Etiology.—The essential predisposing factor is an inherent developmental defect of the spinal cord, especially the postero-internal and lateral columns. The heredity is sometimes direct, but more frequently indirect. Organic insanity, gross alcoholism, syphilis, consanguinity of marriage, epilepsy, or some other degenerative neurosis may constitute the ancestral or parental taint. A generation may be skipped, the parents being apparently healthy, but the grandparent a neurotic. Locomotor ataxia is rare in the family history of this disease. Direct inheritance of the disease itself was found by Griffiths in 33 out of 143 cases. It is somewhat more frequent in males than females (86 males, 57 females—Griffiths's table) and more than two-thirds of all cases develop symptomatically within the first decade of life (99 out of a total of 143—same author). The disease seems to be more common in America than elsewhere, judging from the published cases, and in this country the victims are, for the most part, from the rural districts rather than the cities. It is the rule to find more than one case in a family, and sometimes several brothers and sisters may be affected in succession. The first obtrusive symptoms may follow an acute illness, especially the infectious fevers.

Pathology.—The gross pathological anatomy has been quite satisfactorily demonstrated in a number of reliable autopsies. The extent of the lesions may vary, however, considerably. The cord appears diminished in bulk and sometimes of eccentric contour macroscopically. Occasionally two central canals have been found or the one central canal may be disproportionately large. Various other developmental anomalies may be present. The morbid process is that of sclerosis, which is always well marked in the lateral pyramidal and postero-internal columns, but may also involve the columns of Türck and the direct cerebellar tract. It does not invade the gray matter, which is usually separated from the diseased columns by a layer of healthy tissue. Dejerine believes the sclerosis found in family ataxia to be really a neuroglial sclerosis or form of so-called gliosis, due to a developmental ectodermal defect. The columns of Goll and the pyramidal tracts are affected in varying degree throughout their entire course. The pathogenesis is as yet undetermined.

Prognosis.—The duration of the disease is indefinite. Death may occur from a bedridden asthenia, but is usually due to some intercurrent affection. The disease may be complicated with insanity.

Treatment.—There is little to be done for these patients. Suspension has been tried, but has proved about as useless as in true tabes. Arsenic is at times beneficial. The Fraenkel method is indicated for the symptomatic improvement of the ataxia. Prevention of the disease by means of careful selection in marriage, or, better still, celibacy among the tainted, is much the more hopeful and legitimate line of action. Should the disease appear in the first child, further pregnancies or births should be pre-

vented. In the light of the known pathology and the probable pathogenesis, the idea of preventing the development of the disease by withdrawing the infant from the mother's breast, as has been suggested, seems, to say the least, far-fetched.

Ataxic Paraplegia.

Synonyms.—Progressive spastic ataxia; combined postero-lateral sclerosis.

Definition.—As described by Gowers, it is a combination clinically of ataxia and spastic paraplegia, having an anatomical basis in lesion of the dorsal and lateral columns. The disease, while presenting a more or less constant clinical symptom-picture, is probably not a distinct pathological entity.

Symptoms.—The clinical picture is usually clear cut and constant. The first symptom is ordinarily that of constant fatigue, with more or less unsteadiness in standing or walking. This ataxia is especially marked in the dark or with the eyes closed. The sphincters may be affected at the same time and sexual power lost or impaired. There are no sensory symptoms except, perhaps, a subjective aching in the legs and lumbar region. Paretic weakness in the legs, particularly the flexors, gradually and progressively develops. One leg may be more affected than the other at first. More or less rigidity, with exaggerated knee-jerks, clonus, and contractures, develop. The patient becomes more and more dependent upon assistance in walking, spreading the feet wide apart with eyes fixed upon the floor. The feet are dragged along, however, and not lifted to an unnecessary height and brought down with unnecessary force as in true tabes. The cranial nerves are rarely involved, but the mind undergoes degenerative deterioration in the advanced disease, the mental changes being identical

in character, often, with those of general paresis. The arms may be affected in the same way as the legs, with spastic paralysis and inco-ordination. Trophic symptoms are absent.

Diagnosis.—The clinical diagnosis is quite simple. The absence of pupillary changes, of sensory symptoms, and of Westphal's symptom excludes true tabes readily. The spasticity and exaggerated reflexes with clonus may suggest primary lateral sclerosis, but there is no ataxia in the latter affection. Ataxia and parapareses, with exaggerated knee-jerks, may be present in disseminated sclerosis, but there will be, in addition, involvement of the cranial nerves, intention tremor, scanning speech, nystagmus, etc. Tumor affecting the base of the brain and involving the cerebellum may induce symptoms of inco-ordination and spastic paralysis; but here, again, the addition of cranial-nerve symptoms, especially of the optic nerve, will clear away any temporary confusion.

Etiology.—As with most of the degenerative spinal scleroses, ataxic paraplegia is most common in males during middle life, and the causes, so far as known, are also practically the same. Gowers, Osler, and others deny the relationship of syphilis as a cause except in rare instances: a statement, however, which is disputed by the majority of observers. Lead and other poisons may superinduce the disease. Heredity is a minor factor if it exists at all.

Pathology.—The pathology is a matter of much dispute. As described by Gowers, the lesions consist of sclerosis of the posterior and lateral columns, which is very variable in extent and position and not strictly "systemic" in character, the mixed zone of the lateral and the lateral limiting layer between the pyramidal fibres and the gray matter

being involved quite often. In the posterior columns the sclerosis is frequently more marked in the dorsal than in the lumbar segments. Occasionally a zone of sclerosis has been found in the entire periphery of the cord (annular sclerosis). Türk's columns may be affected. Marie, quoted by Osler, does not consider it a systemic disease. He believes the distribution of the sclerosis to be dependent upon the arterial supply through the branches of the dorsal spinal artery, which are involved. By many the disease is believed to be a form of chronic middorsal myelitis, by others simply an atypical form of tabes, and by others still an atypical variety of multiple sclerosis. An identity with general paresis ascending has been maintained. Such wide-spread variations in opinion necessarily leave the final decision still *sub judice*.

Prognosis.—Except in the syphilitic cases, the prognosis is bad. The duration of the disease is extremely variable. It is essentially slow, however, in progress, and often many years elapse before the victim succumbs. Paralytic helplessness may develop, however, within a few years and become complete. When mental symptoms are manifest early in the disease the prognosis is proportionally worse.

Treatment.—Potassium iodide should be invariably tried in this disease. No harm can result, and the patient is given the benefit of the possibility that syphilis may be the cause.

Syringomyelia.

Definition.—The term etymologically signifies a cavity (abnormal) within the substance of the spinal cord. Such a literal and limited definition is, however, inaccurate and misleading. By almost general consent the word has been restricted in its application to a disease

characterized anatomically by lesion usually and chiefly of the central substance of the cord; pathologically by a gliosis or gliomatosis dependent upon embryonal-tissue persistence, with subsequent perverted cellular proliferation and ultimate cavity-formation; clinically by the presence, in association, of progressive muscular atrophy, dissociation of sensation, prominent trophic symptoms, and scoliosis.

Symptoms.—The clinical picture in syringomyelia is exceedingly variable, as may be inferred from the morbid anatomy. There is not a function of the cord which may not be perverted, and, on the other hand, no disturbance at all may be present or at least recognized. There is no single pathognomonic symptom, nor is there any constant grouping of symptoms which is positively characteristic of the disease. The attempt has been made to classify the disease into clinical subtypes according to the locality first or most affected or the predominance of motor, sensory, or trophic symptoms. Such subdivisions are obviously of but little value. In the very small number of cases in which the diagnosis has been made during life and confirmed by autopsy the clinical history has been about as follows: The patient first notices some aching and pain in the neck, shoulders, and arms, with paræsthesiæ in the hands and fingers. This is followed by an atrophy which slowly affects, first, the smaller muscles of the fingers and hand, and which is attended with fibrillary twitches. Analgesia develops in varying degree in the affected limb, and thermo-anæsthesia, sometimes complete, is also present. Tactile perception may remain either normal or only slightly impaired, and this combination of analgesia with thermo-anæsthesia and preserved tactile perception constitutes

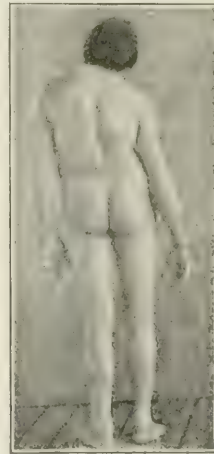
the so-called dissociation of sensation at one time erroneously supposed to be pathognomonic of syringomyelia. Following the atrophy and sensory disturbances, trophic lesions of the skin, hair, nails, bones, etc., develop, and are often quite prominent. Herpes, bullæ, ulcers, felons, and gangrene, usually painless, are among the skin lesions observed. Extensive arthropathies have been noted, and the bones may become quite brittle. Vasomotor symptoms—such as sweating, œdema, redness, or cyanotic discoloration in certain areas or a limb—are quite common. As the disease extends from above downward, the trunk-muscles become involved, and scoliosis, or curvature, develops. Extending still lower, the legs are affected with paraplegic weakness, the sphincters become paralyzed, and sexual power is lost. Just as with the upper, the first symptoms indicating involvement of the lower cord may be irritative—paræsthesia may precede the paraplegia. Should the disease extend upward, bulbar symptoms are added. The trigeminus may be affected and facial atrophy appear. Pupillary abnormalities have been noted occasionally, particularly an inequality in size and response. The eyeball may appear protuberant as in exophthalmic goitre, or the globe may appear to have receded, with narrowing of the interlid space. This condition is often associated with facial hemiatrophy (Schulte). Ataxia of both lower and upper extremities has been observed. The muscular sense, however, may remain normal.

The symptoms are usually bilateral, though they may at first and for some time be limited to one side, and they are often unequal in degree on the two sides. The first symptom may be referable to the dorso-lumbar or the bulbar

segments, in which case, of course, the order of sequence would be reversed. This is the basis for the so-called bulbar and paraplegic types. In certain cases trophic symptoms predominate, due, it has been thought, to a complicating neuritis. Morvan's disease is assumed by many to be essentially identical with this form of syringomyelia. The identity has not yet been proved, although the clinical resemblance is certainly strikingly suggestive.

Literature of '97-'98-'99.

From a study of over five hundred papers which have been published on syringomyelia, it was found that the



A type of deformity in syringomyelia.

following are some of the more characteristic features besides those of progressive muscular atrophy and paraplegia:—

1. The arthropathies of syringomyelia may be divided into two classes: the atrophic, which is the rarer; and the hypertrophic, which in many ways resembles osteoarthritis. These changes in the joints are much more frequent in the upper than in the lower extremities.

2. In 50 per cent. of the cases there is more or less deviation of the spinal column, usually laterally; one type of deformity being shown in the above figure.

3. Vasomotor disturbances are often well marked, particularly by sensation of cold and local areas with excessive sweating.

4. The action of the sphincters is generally normal.

5. Ocular symptoms: Pupils are frequently unequal. Nystagmus has been occasionally noted. Optic disks are generally normal.

6. When the medulla is invaded by the glioma, bulbar symptoms ensue, particularly laryngeal paralysis, while the involvement of the several nerves arising from the pons and medulla will cause corresponding symptoms.

The most characteristic symptoms are due to degenerative changes in the posterior horns of the cord, more particularly the disassociation of thermo-anæsthesia from defects of the other sensations. Innsdale (*Inter. Med. Mag.*, Jan., '97).

The boat-shaped deformity of the thorax, met with in some cases of syringomyelia, consists in a characteristic depression of the central portion of the anterior wall of the chest above the lower margins of the great pectoral muscles, on either side of which the chest-wall rises, so that the shoulders appear to be brought forward. This depression is a trophic lesion analogous to those affecting other parts of the skeleton in the same disease. Astié (*Thèse de Paris*, No. 225, '96-'97).

Diagnosis.—With our present knowledge, or rather lack of it, an inaccurate diagnosis in syringomyelia is not a serious reflection upon individual skill. Of the affections with which it is most likely to be confounded, tumor and hæmorrhage of the cord, myelitis, pachymeningitis, particularly cervicalis hypertrophica, progressive muscular atrophy, and tabes dorsalis are chief in importance. In tumor all irritative symptoms—such as pain, spasm, etc.—are usually far more pronounced, the symptoms are more definitely localized and unilateral, and the rate of progress is more rapid. Tumor elsewhere, especially if malignant,

is significant. In cord hæmorrhage or embolism the onset is abrupt and apoplectiform in nature and the symptoms are rapidly destructive. From myelitis the diagnosis may be, at times, difficult. The more widely distributed symptoms and the more extensive involvement of all forms of sensation, with the relative infrequency of true trophic symptoms in myelitis, should prove sufficient data. The muscular atrophy is often late in myelitis and is more rapid after once beginning. From cervical pachymeningitis the differential diagnosis is at times impossible during life. It is only when tabes dorsalis begins with extensive and vicious trophic symptoms or when, as has been noted occasionally, a tabetic presents the symptom of dissociated sensation that any temporary hesitancy between the two diseases occurs. In leprosy we may have analgesia and severe trophic lesions, but there is no atrophy, scoliosis, or dissociated sensation as in syringomyelia.

Etiology.—The disease is comparatively rare. More cases have been reported among males than females and a large percentage of reported cases have been recognized first between the ages of 25 and 35 years. The essential causative factor is an inherent predisposition dating back to embryonal life. Syringomyelia is not directly hereditary nor is it a "family" disease. No adequate or satisfactory explanation has been offered for the cause of the developmental defect which primarily underlies the disease. Cleft palate, harelip, spina bifida, and other similar defects afford probable analogies. The exciting cause is most often trauma. Prolonged exposure to severe cold and dampness, overexertion physically, toxæmias, malnutrition, and anæmia are some of the contributory or exciting causes to which individual cases

have been ascribed. Syphilis and alcoholism may be indirect etiological factors.

Literature of '97-'98-'99.

The etiological factors in the production of syringomyelia are as follow: The disease has no constant and uniform causation, but is probably due to a variety of causes. Undoubtedly a certain percentage of cases occurs as a result of anomalies of development. In association with such anomalies, or independent of them, the disease may arise as a result of centrally situated gliomata and primary gliosis with cavity-formation. Traumatism, leading to hæmorrhages, with subsequent softening of the hæmorrhagic areas, is also an etiological factor. The rôle which inflammatory processes, as well as the narrowing and closing of blood-vessels, play requires further investigation. Pressure, from various causes, plays but a very small part, excepting in the production of hydromyelia. Infectious diseases of various kinds may play a part in the etiology. The view that there is an association between syringomyelia and an ascending neuritis is not sufficiently supported by facts. Schultze (Berl. Klin. Woch., Oct. 4, '97).

Pathology.—Cavities of the cord may exist as congenital doubling, diverticula, or other anomalies of the central canal, or they may be secondary to acute lesions, such as abscess, hæmorrhage, tumor, etc. Simple dilatation, more or less extreme, of the normal canal may occur, which is known as hydromyelia and which often is unattended by any symptoms whatever, its presence being a post-mortem revelation. In some instances hydromyelia gives rise to symptoms identical with syringomyelia, but the essential pathological basis of the latter disease is a central gliosis of insidious beginning and slow advance. This gliosis originates as follows: In the embryo the central canal or primitive tube is quite large relatively. In the normal development of the em-

bryo this canal closes by gradual approximation of its walls posteriorly, which, uniting, form the normal posterior septum. The anterior walls remain separate, forming the normal central canal. Interruption or perversion of the normal development results in the formation of a cavity. Such interruption may be localized to one or more segments, or it may extend for some distance through the cord. The cell-elements remain of the embryonal or glia type. They are distributed irregularly in the cavity-walls, sometimes occurring as nests resting upon a basement material. These ependymal and periependymal cells and neuroglial or basement tissue, later in life, through the stimulus of trauma or some other exciting cause, begin to undergo proliferation, forming gliomatous masses. The proliferation extends from centre toward periphery and also longitudinally, usually in the posterior areas of the cord first. The most common locality affected is the cervical cord. This new gliomatous tissue, either from inherently diminished vitality or from hæmorrhage or other vascular lesion incidental to the imperfect blood-supply, breaks down and a cavity results. The gliosis may not always end in cavity-formation, but may remain as a tumor or as simple glia hyperplasia, which, however, destroys, by pressure, the normal motor and sensory cell-bodies and their axons or axis-cylinders quite as effectually as does the breaking-down. The tendency to cavity-formation is said to be proportionate to the excess of cellular over basement tissue in the gliosis. Secondly atrophy of the muscles and various forms of peripheral neuritis are among the pathological findings.

Prognosis.—There is no cure for the disease; hence an unfavorable prognosis must be given as regards recovery. The

disease may progress very slowly, however, and a duration of twenty or more years is said to be not uncommon. The progress of the disease may be spontaneously arrested, the symptoms remitting. Such remissions may last through several years.

Treatment.—Gliomatosis of the cord is not amenable to curative or even palliative treatment by any means as yet attainable. Potassium iodide has occasionally proved to be of service in gliomatous tumors of the brain and should be tried faithfully. Silver nitrate, gold salts, arsenic, and iodine are theoretically indicated. Electricity has been almost invariably disappointing, except as a tonic. Change of climate, rest, and general tonic treatment offer the best prospect for an arrest of progress in the disease and the consequent prolongation of life.

W. B. PRITCHARD,
New York.

SPINE, DISEASES AND INJURIES OF.

Tuberculosis of the Spine.

Synonyms.—Pott's disease; spondylitis.

Tuberculosis of the spine—of the vertebrae—makes up the vast majority of group of cases classed under the head of Pott's disease, so called because of the very elaborate account given to it by Percival Pott a little over a hundred years ago. The name of spondylitis has also been given by the Germans to this affection.

The subject of *bone tuberculosis* has already been discussed under the head of HIP-JOINT DISEASE (see volume iii). What was then said of the growth of tubercle in the femur also applies to tuberculosis of the spine.

Symptoms and Diagnosis.—As a rule, the primary focus of disease is in the

cancellous tissue of the body of a vertebra, spreading slowly until the intervertebral cartilage connecting this vertebra with its fellows is involved. It is rare for the disease to remain confined to a single vertebra. It more usually involves several contiguous vertebrae, or there may be present several spots of inflammation, at different locations in the spine, some of which may appear months or even years after the primary infection. If the disease is not arrested, the body of the vertebra is gradually destroyed by the advance of necrosis, and, as a usual thing, unless support is applied to the spine, the superincumbent weight of the body crushes together the softened vertebrae, causing an angle, of greater or less extent, to take place in the spinal column, with a protrusion of the spinous processes. As a rule, the erosion has been toward the front of the bodies of the vertebrae, and the angle takes an antero-posterior position accordingly. But it occasionally happens that the vertebrae have been destroyed more on one side than the other, and a marked bend to this side takes the place of the ordinary antero-posterior deviation. It occasionally happens also, even without the use of apparatus, that large amounts of cancellous tissue are destroyed, even the entire bodies of two or three vertebrae, without the occurrence of deformity, as enough inflammation has been set up in the periosteum to cause proliferation of bone between the transverse processes, the vertebrae becoming firmly ankylosed in a straight position.

Sometimes the seat of the tuberculosis is not between two vertebrae, but in a costo-vertebral articulation. This point must be borne in mind in making a diagnosis before excluding vertebral tuberculosis. Occasionally the focus of disease is found in the transverse arch or

in the spinous processes of a vertebra, but such cases are very rare.

As occurs in tuberculosis of bone elsewhere, the formation of abscess quite frequently accompanies tuberculosis of the vertebrae, and the abscess may extend into the vertebral canal, so as to press on the spinal cord, and give rise to paralysis. The abscess, also, may point anteriorly, and, if in the right situation, may give rise to so much pressure on the trachea or bifurcation of the bronchi as to impede respiration. It may rupture into a bronchus and the pus be expectorated or cause suffocation; it may find its way into the pleural cavity and set up a pleurisy; or it may perforate the bladder or the rectum; but usually such abscesses, if in the dorso-lumbar region, burrow a tract along the course of the psoas muscles, and point either below Poupart's ligament or in the lumbar region, just above the posterior iliac spines.

In the cervical spine these abscesses at times burrow until they penetrate the mediastinum with most disastrous consequences.

In cases of spinal disease a differential diagnosis must be made between tuberculosis, syphilis, and rickets, and this, at times, may be very difficult. If the child be below two years of age, and have several foci of disease in the spine, several other joints involved, or show evidences of syphilis elsewhere, or the parents be known to be syphilitic, it should receive antisyphilitic treatment in addition to protection for its spine.

If evidences of rickets show themselves in large epiphyses, beaded ribs, open fontanelles, abnormal sweating about the head, the spinal curvature is probably rachitic, and a more favorable prognosis given accordingly. If the diagnosis is correct, prompt improvement will

follow changing the diet and administering phosphorus and codliver-oil. The necessity of support for the spine is, however, as necessary as if tuberculosis were present; but the chances are that it will be required for only a short time.

Literature of '97-'98-'99.

Pott's disease in the nursing personally observed 26 times. The seat of lesion was always the lumbar segment of



Fig. 1.—Lumbar Pott's disease, with beginning psoas abscess, simulating lateral curvature of the spine in the position patient holds her body. (*R. H. Sayre.*)

the vertebral column, at the first or second vertebra; 22 out of 26 times. There is at first always paraplegia, followed by rigidity of the lumbar region, and then a large lumbar gibbosity, not angular. The paraplegia may be distinguished from infantile palsy by the fact that it affects both legs, is never complete, and the reaction of degeneration is not present. From rachitis it may be differen-

tiated by the freedom from pain on pressure.

When deformity is the first symptom it may simulate rachitic lumbar kyphosis or a transitory vicious attitude. In either of these conditions the lumbar portion of the spine remains supple, and when there is ankylosis in rachitis it is a lumbo-dorsal kyphosis, which is readily recognized. Froelich (*Annales de Méd. et Chir. Infant.*, Jan. 15, '99).

A large proportion of the cases of tuberculosis of the spine do not prove fatal, and, if adequate mechanical support is applied before the occurrence of a deformity, the latter should be prevented, or at least should not be conspicuous. As in tuberculosis in other joints, absolute rest of the inflamed area and the building-up of the patient's general nutrition to the highest possible point are the two essentials of treatment. A certain percentage under the best of care do not improve, but develop abscesses, have amyloid changes in the viscera, or develop pulmonary or meningeal tuberculosis, the latter being much more frequent.

In order to secure a favorable position of the spine, early diagnosis is important, as the disease, in all instances, precedes the deformity for a considerable time, and deformity here, as elsewhere, is more easily prevented than cured. Pain, muscular spasm, and slight elevation of temperature are the three diagnostic points to be noted. The pain is referred to the distal extremity of the nerves which pass from the spine at the point of inflammation, and the symptoms, in consequence, vary with the location of the disease. In the first and second cervical vertebræ occipital headache may be noted, and the position of the head may resemble very strongly that of torticollis. In torticollis, however, the face looks upward and away

from the contracted muscles, while in cervical tuberculosis the face, though turned to one side, is directed downward rather than upward, in my experience. In torticollis pain is not present, and the muscular spasm pathognomonic of joint inflammation does not exist: simply a chronic contracture of certain muscles. An elevation of the temperature, to 99° or $99\frac{1}{2}^{\circ}$, will also probably be found associated with tuberculosis.

One symptom which is pathognomonic of inflammation in the first and second cervical vertebræ is pain, or sometimes a sense of impending death on being placed in the recumbent position. The writer has seen patients with disease in this region who have been unable to lie down to sleep for weeks at a time, until adequate support was applied. The anatomical construction of the first and second vertebræ accounts for this peculiarity. While recumbent, the weight of the head presses the body of the atlas back against the odontoid process of the axis, while in the upright or slightly anteflexed position the latter is freed from pressure, and, therefore, this position is chosen by preference when the disease is situated in these two vertebræ, whereas recumbency gives relief when the disease is in any other portion of the spine.

With this particular location a prognosis must always be reserved, as the possibility of entire erosion of the odontoid process or rupture of the check ligaments and consequent fatal pressure on the cord must always be borne in mind, although a case has been reported in which the entire odontoid process has sloughed away and been expelled through an abscess, with recovery of the patient, the vertebræ having been ankylosed previous to the destruction of the odontoid.

A little lower in the neck the disease gives rise to difficulty in respiration, and a curious kind of breathing, somewhat resembling the noise of croup or whooping-cough, while at the dorso-cervical junction the disease at times produces auscultatory sounds which exactly resemble a general bronchitis, and which disappear when traction is made upon the head, to reappear again the moment it is relaxed. In the majority of cases of upper dorsal disease there is a peculiar grunting respiration which is pathognomonic, and once heard cannot be mistaken.

When the disease is situated in the dorsal region, pain may be referred to the front part of the chest or pit of the stomach, and the diagnosis of indigestion made in consequence, while, when it is a little lower in the spine, the child is often treated for worms and colic for months before the actual nature of the disease is ascertained. In this region also, pain may be referred to the bladder, perineum, or the rectum, and in the lower lumbar region differential diagnosis between disease of the spine and hip may possibly be called in question, the pain being referred to the inner side of the thigh and to the knee. At times, with disease in the lumbar region, a sharp contraction of the abdominal muscles may be noted, before the appearance of a knuckle in the spine, giving the appearance of a string tied tightly around the belly.

It is rare for pain to be felt at the point of disease, except when disease has been in existence for some time, and this pain is usually elicited by blows and jars or sudden twisting of the spine, and not by direct pressure; in fact, in many cases, if the patient be laid face downward and pressure made on the knuckle, relief and not pain will be given, on ac-

count of the removal of pressure from the inflamed surfaces.

The gait of the patient with spinal disease is most characteristic. There is a careful, apprehensive tread, the ankles, knees, and hips being flexed to avoid jarring the spine; and the patient steps upon the toes instead of walking with the heels first striking the ground, as is usual. On bending to pick up an object a child with Pott's disease will flex the ankles, knees, and hips, and squat down, rather than bend forward, in the normal attitude which a child would assume, and in walking around a room will frequently support itself by the table, chairs, or any other object which is convenient, taking care not to release its grasp of one until it has secure hold of another. If compelled to walk by itself, it may support its trunk by placing both hands on its thighs and stiffening the arms, thus transferring the superincumbent weight of its body to its legs by means of the arms, and relieving the spine of pressure. Usually, these patients will complain that riding in street-cars or across rough pavements causes pain, and that, under these circumstances, they are obliged to place their hands on the seat of the carriage, and support the body in this manner. If the disease is high up in the spine, the head is very frequently supported by the fingers placed beneath the chin, and on looking to either side the entire body is rotated, and not simply the neck. When the disease is in the dorsal region the child often walks with the head thrown as far back as possible, the face looking toward the sky, in order to relieve the front part of the bodies of the vertebræ from pressure, and a mistaken diagnosis of cervical disease be made in consequence.

The diagnosis, of course, is simple if

the disease has advanced sufficiently far to produce deformity, but, long before the occurrence of the latter, symptoms are present which, if properly interpreted, will enable the physician to arrive at a correct diagnosis. It is important that the patient's trunk be stripped, and the attitude carefully noted. The clothing having been removed from the trunk, the patient should be made to bend forward and backward and to both sides, and the occurrence of spasm in any of the muscles of the trunk carefully noted. Marked tenderness to pressure along the entire length of the spine, without the occurrence of muscular spasm or deformity is a pretty sure indication of the so-called "hysterical" spine, as opposed to tuberculosis. If muscular spasm be found on any manipulation of the spine, any pain on bending or on concussion, with pains referred to the anterior part of the body, combined with an elevation of perhaps a degree in the temperature, the chances are almost certain that you have to deal with an inflammation of the spine, even though no deformity is apparent.

In such cases, where no deformity exists and the vertebral joints are healthy, it is well to examine the costo-vertebral articulations, taking the ribs one by one and pressing their heads against the vertebræ, in order to detect, if possible, any inflammation in this situation. In doubtful cases if the temperature is elevated the chances are that inflammation is present in the spine, and it should be protected accordingly until time shall have cleared up the diagnosis.

Hyperæsthesia in the region of the lumbar spine does not afford a sufficient reason to admit the existence of Pott's disease, especially when the other symptoms of the affection are entirely absent; but it is well, nevertheless, to be careful, for a superficial examination of a pa-

tient may lead to an error. Gendron and Brunet (*Ann. de la Policlin. de-Bordeaux*, July, '96).

Literature of '97-'98-'99.

Among the conditions which simulate caries are the following: 1. Neuroses of the spine. There is pain in the back and points of tenderness over the spinous processes and lateral processes. Often there is a history of injury. 2. Lateral curvature, accompanied by pain and tenderness. 3. Rheumatic spondylitis. 4. Fracture of the spine. 5. Multiple osteomyelitis (tuberculous), involving some portion of the vertebræ. 6. Malignant disease of the vertebræ. V. P. Gibney (*Med. News*, Feb. 20, '97).

In all patients attacked by Pott's disease, adults or children, some changes are produced in the height. In adults it diminishes before old age, even without the occurrence of the hump. In children the growth of the spine is arrested, and the height increases only by increase in the lower limbs and head. In the early stages of the disease the height diminishes. The growth of the posterior arch and the cuneiform flattening of the bodies only aggravate the gibbosity without elongating the vertical dimensions of the thorax. The child regains its powers of growth when the curve is reduced, and along with this comes a correction of the form of the thorax, and an improvement in the vital forces from the better condition under which the thoracic and abdominal viscera act. Bilhaut (*Ann. de Chir. et d'Orthop.*, Jan., '98).

In Pott's disease the foci of disease both in antero-posterior and lateral views have been demonstrated by the radiograph. The initial lesions are detected in this manner.

The radiograph shows how many vertebræ are affected and to what extent. It also shows the extent of the lesions, the loss of substance, the existence of sequestra and tubercular cavities, the degree and cause of the reflection of the thorax. In cases in which the abscess has been treated by iodoform injections the size of the abscess and its shape are clearly shown.

Radiographs taken at different periods

mark the progress or regression of the disease. Redard and Larau (*Revue de Chir.*, Nov., '98; suppl.).

Etiology.—Traumatism plays a most important part in tuberculosis of the spine, as it does in tuberculosis elsewhere, and by careful study of the case an injury can very frequently be traced as the exciting cause of the tuberculosis. The gradual way in which tuberculosis usually develops causes observers frequently to overlook the connection between the traumatism and the disease, just as the disease is frequently overlooked or mistaken for something else until the appearance of a knuckle in the spine, which is usually months and sometimes years after the onset of the first symptoms of peripheral nerve irritation.

Literature of '97-'98-'99.

The following are some of the results noted from a collection of the statistics of spondylitis from the pens of a large number of the leading surgeons, and also from personal experience. Among 187,260 patients spondylitis occurred 810 times, and most of the cases developed before the tenth year of life, and after 15 there was a sharp decline in the percentage of cases; 53.25 per cent. were males. As an etiological factor trauma was present in 53 per cent. of the cases of spondylitis, and in 16.6 per cent. were hereditary tendencies traceable. The seat of predilection was the lower dorsal, scarcely less frequent were the lumbar vertebræ attacked, while the lower cervical was very seldom assailed. Vulpius (*Archiv f. klin. Chir.*, B. 58, H. 2, '99).

Treatment.—The diagnosis having been established, treatment should consist of physiological rest of the inflamed vertebræ. In children under three years of age, this is best secured by recumbency in a wire cuirass comfortably padded and made to fit the shape of the entire child. In this cuirass the child is placed and the legs and the body band-

aged to hold it firmly in position; traction is then made upon its head by means of a leathern head-support, which passes under the chin and occiput, and is attached to a cross-bar which is suspended from an upright fastened to the cuirass. Unless traction is made upon the spine in this manner, a knuckle is very sure to develop from reflex muscular spasm, even in spite of the recumbent position.

If the disease is in the upper dorsal region, provision should be made for holding the shoulders by means of the attachment suggested by Dr. Whitman, which consists of two hard-rubber caps which fit the heads of the humeri and which are connected together by a steel rod passing across the front of the chest; the straps pass above and below the shoulders from buttons on the rubber caps to the back part of the cuirass, and the shoulders are thus held thrown well backward.

The use of straps passing around the shoulders to hold the latter back is decidedly less efficacious than the Whitman apparatus, which exerts pressure on the heads of the humeri and by means of the rod keeps them thrown well back and thus controls more effectively the movement of the vertebræ.

In the cuirass the child may be taken out in a large baby carriage, and receive the benefits of sunshine and fresh air. The bandages should be removed every day, and the child's skin kept in proper condition. Every few days, if need be, the child may be removed from the cuirass by rolling it on its stomach and washed with water and a little alcohol. This treatment is much to be preferred to keeping the child recumbent in a cot, with traction on the head with weight and pulley, as in the cuirass it is able to enjoy the benefits of out-door life and be carried up and down stairs.

which is not practicable with the use of bed treatment. The child should be placed in the upright position as little as possible, and pass most of its time recumbent. If simultaneous disease of the knee or hip is present with spinal tuberculosis, the cuirass is also the proper treatment.

If the child be larger, and the pelvis sufficiently developed to be used as a point of support, apparatus may be applied to protect the spine and allow the child to walk.

If the disease is in the cervical region, a jury-mast should be applied, which may be fastened either to a plaster jacket or to a steel back-brace. If the latter is used, it must receive support either from the shoulders of the child or from the crests of the ilium, the latter being, by all odds, the best point from which to make upward traction, as pressure on the shoulders is not only inconvenient, but variable, the scapulæ being constantly in motion.

If the disease is in the first or second cervical vertebra, the head must be held absolutely rigid, and prevented from rotating by means of a metal head-support fastened in position by a brow-band and connected to a body-brace by a rod passing down the back of the neck having universal joints at the occiput and seventh cervical vertebræ in order that the apparatus may be adjusted to the head in its position of distortion and gradually altered as the subsidence of inflammation allows the head to be placed in a more normal position.

If the head is not turned far from a straight line, it may not be necessary to use the two universal joints, and simple uprights of malleable iron bent to fit the shape of the neck and head will suffice, the ordinary jury-mast being used for this purpose. If it is not practicable to

obtain such an apparatus, plaster-of-Paris bandages enveloping the head, neck, and trunk, like a suit of armor, may be used with success.

In the lower cervical vertebræ rotation may be permitted.

If the disease is in the upper dorsal vertebræ, any apparatus which is not supplied with means for sustaining the superincumbent weight of the head is defective, whether it be an antero-posterior steel brace or a plaster jacket.

With the disease in the dorsal region, the spine may be supported with the antero-posterior steel brace.

A spinal brace should be made of steel so tempered as to be capable of being bent by a large pair of monkey wrenches, and should be accurately fitted so as to support the entire spine. There should be two back-bars, one lying on each side of the spinous processes, and connected by cross-rods, which should be so curved as not to press on the spine where they cross it. There should also be a pelvic belt, with padded bands attached, which pass over the iliac crests, in order that the weight of the head may be transmitted here and so removed from the inflamed vertebræ. Control of the head is obtained by a metal rod passing from the back-bars of the brace over the top of the head and supplied with a cross-bar from which depend a leathern head-support passing under the chin and occiput. From the back-bar project other bars which pass behind the scapulæ and project a trifle above the shoulder, and from these straps pass in front of the shoulders and under the axillæ and fasten again to buckles on the back-bars. The reason these bars project above the shoulders is to prevent the straps from crowding the shoulders down, as they are only intended to force them back. As the straps by themselves would slip

into the fold between the humerus and the chest, they are kept from so doing by fastening them to two concave rubber caps which rest against the front of each humerus and are connected by a curved metal bar, according to Dr. Whitman's suggestion, which keeps them apart; and in this manner the motion of the shoulders is much more effectually controlled than if the straps alone were employed. A linen apron with straps to fasten it to the back-bars keeps the entire apparatus in place. In order that this shall be of use it must support the spine accurately, and should be fitted with great care. The patient should be placed in the prone position and the outline of the spine taken with a strip of flexible lead or other metal and the back-bars then bent to conform to this outline by means of a pair of wrenches. The bars may require to be twisted side-wise as well as in an antero-posterior direction, and should be so adjusted that when the patient is upright the entire spine is thoroughly supported. This will be found to be a difficult task in cases presenting decided deformity. The fitting of such apparatus should be done by the physician himself in his office, and not left to the instrument-maker, and upon the perfection of support will depend the benefit derived from the apparatus.

In many cases the improved position of the patient requires that the back-bars should be straightened from time to time.

Literature of '97-'98-'99.

The application of a steel brace of any make in Pott's disease of the spine, where there is the least lateral deviation, is a practice to be condemned, because such cases invariably increase in deformity, on account of the mechanical conditions in the vertebral column. Destruction of bone will certainly increase,

whereas, if suspension is applied and a properly-fitting corset adjusted, no pressure is made at point of disease, and the rotation will not increase. Patients with Pott's disease of the spine treated with the aluminum corset are enabled to go in bathing at the sea-side during the summer months, which is a very great advantage. A. M. Phelps (Med. Register, Apr. 15, '99).

In my experience better results are obtained from the use of the plaster-of-Paris jacket than from any other means of support except in cervical and high-dorsal cases, where a steel brace is preferable.

In applying plaster-of-Paris bandages to make a jacket the following directions should carefully be observed:—

Cross-barred muslin or crinoline should be the material used in making the bandages. Frequently the kind of sizing used in the manufacture of this muslin prevents the plaster from setting quickly. It should therefore be washed to get rid of the superfluous sizing before being torn into strips from three to four inches in width and three yards in length. Of course, the selvage is to be torn off. These strips are drawn through a tray filled with freshly-ground plaster of Paris, and enough rubbed into the muslin to fill all the meshes. The bandages are then rolled moderately tight and laid in an air-tight tin until required for use.

The patient should have the body covered with a tightly fitting knitted or woven woolen shirt, without sleeves, tied tightly over the shoulders and drawn down and securely pinned over a folded towel in the perineum. For this purpose a safety-pin should always be used. If the patient is a female, pads of proper thickness should be placed over the mammae and under the shirt, which pads are to be removed when the plaster sets, thus preventing pressure on the

glands. Another towel, folded in such a shape as to cover the stomach and bowels, called the "dinner-pad," which also is to be removed after the plaster sets, is placed inside the shirt, thus providing space for the expansion of the stomach during the process of digestion. If the patient has partaken of a hearty meal just previous to the application of the plaster, this dinner-pad may be omitted.

The patient now being prepared for the application of the bandages is placed in the suspension apparatus, which consists of a pair of padded straps, which pass under the axillæ, and a leathern head-piece, which passes under the chin and occiput, all of which are suspended from an iron rod, which, in turn, hangs from a compound pulley suspended from the ceiling, door, or other convenient place. For use in patients' houses a folding tripod of wood is very convenient. Traction is now made on the head and arms evenly, the straps being lengthened or shortened until the pressure is evenly distributed.

Traction is now made very slowly and gently, and only carried to the point of giving the patient perfect comfort, and never beyond that point.

In some cases the heels will be slightly raised from the floor before this point is reached, but in many instances the heels will not be raised from the floor at all; and as the sensations of the patient are the only guide as to the amount of traction needed, an anæsthetic should under no circumstances ever be given, as has been done by some surgeons, as one requires the intelligent co-operation of the patient himself in regard to the amount of traction required. If it is a child not old enough to talk and tell its feelings, watch carefully the expression of its countenance; and when it is changed

from pain to pleasure, there stop, never making traction beyond that point, and immediately apply the plaster bandages with great care and accuracy, pressing them into all the irregularities and covering the entire trunk from the pelvis to the top of the sternum.

If the patient is kept suspended in this position till the plaster is set, it will retain the body in the position of perfect comfort which suspension has given it.

In applying the bandages one should be placed on end in a basin or pail of tepid water, deep enough to completely submerge it, when bubbles of gas will at once begin to escape. As soon as the bubbles cease, the plaster will be all moistened and the bandage ready for use. Do not add salt to the water, as it renders the plaster brittle. Squeeze out the superfluous water before applying it, and place another roll, end up, in the water, which will be ready for use by the time the first one has been applied, and proceed thus until the entire jacket has been completed. The reason for placing the bandages on end in the water is that the gas may escape and thus enable all the plaster in the roll to be evenly moistened. If laid on the side, the moisture will only extend to some parts, leaving others dry and unfit for use.

The patient being suspended, the jacket is applied by the surgeon, standing or sitting at the back of the patient, while an assistant sits in front, steadying the patient by his knees and rubbing and smoothing the bandages which are being applied.

Begin at the waist, taking one or two turns around the smallest part of the body, and then going down in a spiral form, each layer overlapping the other half or two-thirds of the width of the bandage until reaching the trochanters;

then, having taken one or two turns around the pelvis, reverse the bandage, and gradually proceed in the same spiral manner upward until you have covered the entire body to the top of the sternum.

This process is repeated till the jacket is sufficiently thick to support the body, the number of bandages required for this purpose, of course, depending on the size of the patient.

In cases where the disease is in the lower loral or lumbar vertebræ this is all that is required. If the disease is at the middorsal or cervical vertebræ, it then becomes necessary to add the jury-mast to the jacket in order to take off the weight of the head from the vertebral column.

In many instances great advantage is derived from the addition of Whitman's shoulder-brace to keep the chest well expanded, and press the shoulders back into the jacket.

Several modifications have been made in the application of plaster bandages, as Davies's hammock, in which the patient was suspended, face downward, while traction was made on the head and heels by an assistant. Goldthwaite, of Boston, has recently advocated the application of plaster jackets while the patient lies on the back, traction being made on the head and heels by a windlass, the most prominent part of the curvature being supported by a little upright, the weight of the patient's head and shoulders tending to correct the deformity. Goldthwaite, in this manner, claims to have produced a very great improvement in curvature of the spine in various cases.

Taylor, of Baltimore, applies plaster jackets, the patient being fastened to a bicycle-saddle, while pressure is made against the kyphos and the sternum by

means of arms which project from the apparatus, while traction is made on the head, upward and backward, by means of a pulley.

In the great majority of cases the jacket can be applied while the patient is suspended vertically, with the greatest ease to himself and the surgeon; but in exceptional cases, where there is paralysis, where the heart is too weak to allow the patient to remain upright for any length of time, or in cases of excessively fat and feeble people, Davies's hammock, with holes cut to allow projection of the head and feet, or Goldthwaite's apparatus is to be preferred, traction being made at both ends of the body to the point of comfort while the jacket is being applied.

Literature of '97-'98-'99.

The kyphotone is intended to make traction backward on the trunk and spine during the application of the plaster jacket. The advantages claimed for it are: (1) the spine is fixed in the most advantageous position; (2) the rapidity and ease with which the jacket can be applied; (3) its applicability to cases of middorsal, lower dorsal, and lumbar caries; (4) the removal of the superincumbent weight from the diseased articular processes; and (5) the inexpensiveness of the apparatus. R. T. Taylor (*Phila. Med. Jour.*, June 17, '99).

The question of the management of abscess is an important one, and opinions differ very widely as to the proper mode of procedure. If the patient is doing well, with a temperature below a hundred, appetite and digestion good, it seems wiser not to interfere with these abscesses, especially if the disease is between the first and twelfth dorsal vertebra, as the chances for absolute evacuation of all tubercular material and the removal of all diseased foci are not sufficient to warrant interference, which may

set up a mixed infection. If the abscess has approached near the surface and seems about to burst, it is wisest, in most instances, to cleanse the skin thoroughly, and apply an antiseptic dressing. When the abscess discharges, this dressing should be changed as frequently as the amount of discharge may require, care being taken to prevent infection of the wound at such times.

The patient should also be compelled to take much more rest than ordinarily, when abscesses are present, as they increase in size much more rapidly if children run about.

If the abscess has become infected with pus-organisms, however, the condition is different, and free incision should be made, either in front or in back, or both, according to the situation of the abscess, and the abscess-cavity freely laid open and washed out with hot Thiersch's solution. If the patient's condition and the location of the diseased focus will permit it, exploration of the abscess-cavity should be made, and all carious bone removed. In the lumbar region this is practically simple, but in a tuberculosis of the dorsal spine the problem is much more difficult. It may be necessary to resect the head of a rib in order to secure sufficient space to thoroughly explore the spine. Great care should be taken to push the pleura in front of the finger, and not tear it in approaching the body of the vertebra.

The safety of the patient demands that there should be short and direct drainage to the initial point of inflammation: otherwise these abscesses are apt to form sinuses which run for years, become infected with various micro-organisms, and finally set up amyloid degeneration of the liver and kidneys.

In the upper cervical vertebræ an abscess may point in the back part of the

pharynx, and the question may arise whether to open it through the pharyngeal wall or from the outside of the neck. The objections to the first proposition are the difficulty of cleaning the abscess-cavity thoroughly, in the first place; secondly, the impossibility of keeping it from becoming infected later on; and, third, the danger of infection elsewhere from swallowing particles of tubercular *débris*.

In case the abscess is increasing in size and in danger of rupturing into the mouth or of burrowing down the neck, it is better to open it from the outside of the neck. Unless the abscess points elsewhere, it can be well approached by an incision behind the sterno-mastoid, blunt dissection, pushing aside the muscles of the neck, carrying the opening easily to the spine and the abscess. After the latter has been thoroughly evacuated any caseous bone that can be reached should be removed and the cavity packed.

In case the abscess presses on the spinal cord and causes paralysis, a question of operation for the relief of pressure comes in: but this is of very doubtful value. The pressure on the cord will probably diminish in a few months' time, on account of the abscess forcing its way outside of the spinal canal, the restoration of function taking place along with removal of pressure from the cord. If the laminae have been removed for the purpose of exposing the abscess and freeing the spinal cord from pressure, the only strong part of the vertebræ at this point has been removed, and, if such an operation were performed, there would be nothing left to support the spine. In the writer's judgment, therefore, the question of operating on these abscesses is altogether different from the removal of the laminae, in cases of fracture, and should

not be undertaken until sufficient lapse of time has shown that all chance of improvement in other ways is improbable.

Very exceptionally, paraplegia in spinal tuberculosis is not caused by the pressure of the products of inflammation on the spinal cord, but by the narrowing of the spinal canal, in consequence of the collapse of the bodies of the vertebræ. But this is of extreme rarity. In these cases laminectomy is advisable. All cases of laminectomy should have the spine supported and protected by a plaster-of-Paris corset for months, just as though the operation had not been done.

The technique of laminectomy is discussed under FRACTURES OF THE SPINE.

Literature of '97-'98-'99.

Operative measures for treatment of spondylitis include aspiration of abscesses, with or without antiseptic injection; simple incision and drainage; and incision followed by erosion, with flushing with hot water, the wound being closed by suture and no drainage provided. Other operations attack the spinal column, either for the removal of necrosed bone or for erosion of the carious areas; and laminectomy may be performed for the relief of pressure-paralysis.

Incision of an abscess is demanded when the patient suffers from septic symptoms, when the location of the abscess is such as to prevent effective mechanical restraint to the diseased area, and when the abscess threatens important structures. Incision in cervical disease is made behind the sterno-mastoid muscle; in dorsal disease, by the side of the vertebræ; in lumbar disease, just outside the erector spinæ; and, in the case of psoas abscess resulting from disease in any part of the spinal column, an opening may have to be made above or below Poupart's ligament or even in the lumbar region. J. Ridlon and Robert Jones (*Phila. Med. Jour.*, Jan. 21, '99).

Forceful reduction of the deformity consequent on erosion of the front part of the bodies of the vertebræ has recently been revived by Calot. The patient is anæsthetized, placed face downward on a firm table, and traction made on the head and feet either by assistants or by compound pulleys. Pressure is then made on the prominent boss until the spine is forced straight. The patient is then enveloped in a plaster-of-Paris jacket, which extends upward so as to include the neck and head.

This is a revival of a procedure as old as any in medicine, and time enough has not elapsed since its last reintroduction to say whether it has anything to recommend it. A number of cases of sudden death and more of death following soon after the operation have been reported. There is danger of rupturing abscesses or of re-exciting inflammation by tearing apart old adhesions. Forceful replacement in the hip and knee are often followed by success, but the conditions in these joints are such that firm adhesion of the joint surfaces can be secured. In the spine, after destruction of the anterior part of the bodies of the vertebræ the straightening must cause a gap between the vertebral bodies, and until this is bridged by new bone the spine is in a condition requiring support. Whether or not Nature can fill these gaps with solid bone except in favorable instances must be proved, and time will be necessary before this method can be approved, except in exceptional cases. Gradual reduction by suspension or by horizontal traction supplemented by backward bending of the spine without the use of an anæsthetic is more feasible, and whichever mode of correcting the deformity is adopted the spine must be held in the corrected position until it can be so maintained by the patient;

that is, until the disease is cured, which may be a matter of years.

Judging from an experience of 37 cases, all children with Pott's curvature of the spine can be cured without deformity, by forcibly correcting the curve as soon as it appears. The patient is put under an anæsthetic, while four assistants pull the upper and lower extremity of the spinal column backward, and the surgeon exerts strong pressure on the convexity of the curve. When the spine has thus been straightened a plaster jacket reaching from the head to the pelvis is applied. If it is impossible to correct the curve by these means, the projecting spinal processes should be removed. Exceptionally, however (in 2 out of 37 cases), the posterior wedge of bone which prevents the vertebral column from being straightened must be excised. Then, after cutting through the bone anterior to the spinal canal the column can be replaced in its normal position. Only five to ten months are needed for a cure, and the occurrence of paralysis is largely prevented. Calot (*Sem. Méd.*, Dec. 23, '96).

Literature of '97-'98-'99.

In rapid reduction of Pott's curvature of the spine, as a result of experience in thirteen cases, the following conclusions are reached: 1. Rapid reduction at one sitting is an excellent treatment for Pott's curvature. 2. Direct pressure must be applied to the deformity, while extension and counter-extension are being used. 3. Traction must be applied by means of pulleys. 4. Traction ought to be applied to the head and pelvis, and not to the superior extremities, as advised by Jeannel. 5. As a rule, forty-five to fifty kilogrammes of traction are all that should be used. In exceptional cases eighty kilogrammes may be required. 6. Chloroform is dangerous, and ought only to be used during the operation, not while the dressings are being applied. In cases of recent deformity without ankylosis it may be possible to omit all anæsthetics. 7. With the exception of the dangers of anæsthetics and broncho-pneumonia, the post-opera-

tive accidents are of but little importance. 8. The method can be used in almost any case of kyphosis, but it gives the best results in recent cases in the young. 9. All preliminary cutting operations are useless and dangerous. Thomas Jonnesco ("*Proceedings of Tenth Inter. Congress of Med.*," '97; *Annals of Surg.*, Dec., '97).

The results of the immediate correction of the deformities of Pott's disease so far reported are as follow: The general condition seems to have been influenced favorably, although there are a number of cases where there was a generalization of the disease. The amelioration might, however, have occurred if the same care and hygiene had been applied without the operation.

The abscesses do not seem to have been influenced either way by the operation. The paraplegic phenomena seem to have been aggravated in some cases, but more frequently been ameliorated or entirely cured. These results have been obtained by other methods of extension or suspension.

The actual correction of the deformity has not been as yet proved to be permanent, and it is doubted if its value can compensate for the nine cases of sudden death already reported. Wiart (*Rev. de Chir.*, No. 11, '98; Nos. 1 and 2, '99).

Conclusions in regard to the treatment of Pott's disease are as follow: 1. Sufficient experience with the operation of forcible reduction of the deformity in Pott's disease has been accumulated to enable each surgeon to decide whether the procedure is or is not at present justifiable. 2. The theoretical dangers of the operation have not received much support in practice; enough, however, to demand that they be taken into account. 3. Calot reports better results and appears to be more hopeful than anyone else. 4. We should be justified in performing the operation if we could be sure of ultimate good recovery without deformity or with greatly diminished deformity. 5. Satisfactory evidence that the ultimate result will be good is wanting, while the post-mortem findings quoted are anything but reassuring. Galloway.

(Canadian Jour. of Med. and Surg., Feb., '99).

Forcible reduction personally performed on 9 cases of Pott's disease and 1 of rickets for the purpose of correcting by direct force a spinal deformity. In 3 cases under observation for six months the straight position secured by the application of force has been maintained. In 1 of these the gibbosity formed an angle of 105°, and involved the bodies of seven vertebrae.

In 1 child one month after correction of the deformity an abscess opened at the point of curvature. The spinous process and the lamina of the second dorsal vertebra were resected, and three months later the child was well. One case was followed by death, due to disseminated tuberculosis. The only contra-indication to this method is an old and very solid ankylosis. Ghillini (*Revue de Chir.*, Feb. 10, '99).

Scoliosis, or Rotary Lateral Curvature.

Rotary lateral curvature of the spine, or scoliosis, is one of the most insidious diseases with which the surgeon comes in contact, and which offers one of the most difficult problems orthopaedic surgery is called upon to solve. The age at which it appears is usually said to be between twelve and fourteen, but this is erroneous, as, in the vast majority of instances, the deformity begins in very early life, but, on account of the absence of pain, it is not detected until well-marked bone-changes have taken place. Another reason for the statement that it occurs in early adolescent life is found in the fact that bone-growth at this time advances with great rapidity, and, in consequence, deformities which have remained quiescent for several years quickly assume marked proportions, on account of the rapid increase in the child's stature. Coincident with this adolescent bone-growth, we have what has been called "adolescent rickets": a disease which, in this country, has received very scant attention,

but which is well recognized on the continent of Europe; and the softened condition of the bones then present is responsible, in my opinion, for the very rapid progress which some cases of lateral curvature make in a few months' time. Some observers record instances of lateral curvature which they have observed at birth. In the writer's personal experience the youngest case was six months of age, but the curvature had evidently been present for some time.

Rickets is a very frequent cause of scoliosis, and, as foetal rickets has been observed, it is quite probable that scoliosis may, in a number of instances, be congenital.

The next most frequent cause of scoliosis is anterior poliomyelitis, and many cases are due to this cause which are not usually so recognized, because the extremities, if involved in the original paralysis, have recovered so as not to be noticeably deficient. In some cases of anterior poliomyelitis certain trunk-muscles have been damaged to such an extent as to impair the equilibrium between the two halves of the body, and so constitute a constant force working steadily toward the distortion of the thorax, which is only overcome with the utmost difficulty. The same condition, involving one or two muscles of the leg, may in time produce a most obstinate talipes, the damaged tissues growing at a slower rate than the healthy ones, and warping the foot, in consequence, toward the weaker side; just so, the spine, growing irregularly by reason of defective nutrition in certain parts, fails to maintain its symmetry; and the problem which confronts the surgeon, of supporting the trunk in as nearly a normal position as possible until the final stage of bone-development has been reached, is a most difficult one to solve.

In some cases scoliosis arises after a severe pneumonia, usually when the latter has been accompanied by pleurisy, especially if the pleurisy has been purulent, the restriction of the movements of the thorax on the affected side being responsible for the impaired bone-growth which follows. The German writers have contended that this variety of scoliosis is not a true scoliosis, and that rotation of the vertebræ does not take place; but a number of cases which have come under observation have convinced the writer that this view is erroneous, and that rotation of the spine always accompanies this variety of scoliosis.

Inequality in the length of the legs, owing to fracture, congenital dislocation, hip disease, and so forth, at times produces a scoliosis, but, unless the shortening of the leg is due to a paralysis, the scoliosis is usually of very limited extent, and can be almost entirely removed by equalizing the length of the legs by means of a thick sole.

In very rare instances scoliosis follows traumatism, as in one of my cases, where a difficult delivery following a transverse presentation caused separation of the ribs from the sternum, and later on in life a most exaggerated rotary lateral curvature of the spine.

Sometimes scoliosis which progresses rapidly during adolescence is caused by ovarian neuralgia, which sets up reflex contraction of the muscles which control the spine and causes a deformity which rapidly subsides on relief of the pain. In rare cases hysterical contractions may produce a deformity resembling scoliosis so closely as to be mistaken for it.

There is a class of scoliotics in which, apparently, none of these conditions is present to account for the occurrence of the disease, and they are classed as idiopathic. But the number of such

cases grows smaller the more closely we study them, and it is my opinion that rickets or some central nervous lesion, analogous to anterior poliomyelitis, is the true cause of these so-called "idiopathic" cases.

Diagnosis.—In no disease is early diagnosis more important than in scoliosis. The clothing should be removed as far as the great trochanters, the skirts being securely pinned around the hips. The undershirt should be removed and hung like a pinafore over the chest. Sufficient time should be allowed to elapse for the patient to become accustomed to her strange surroundings, in order that she may assume her usual attitude, as, at first, it is quite likely she may hold herself more erect than usual. In the vast majority of cases the dorsal convexity is upon the right side, and, for sake of illustration, it will be supposed the case under examination has this variety of scoliosis. Normally, a plumb line from the nape of the neck should pass midway between the scapulæ and through the intergluteal fold, striking the floor midway between the feet. If there is any deviation from this line, the patient's attitude is not correct. In the ordinary scoliosis the right scapula is farther from the median line than the left, the right hand hangs farther away from the hips than the left, and there is a larger space between the right elbow and the waist than between the opposite side of the waist and the left elbow. Quite frequently there will be noticed an inequality in the heights of the shoulders, the shoulder on the side of the dorsal concavity being the lower. The hips very often show an apparent difference in height, the hip on the side of the concavity appearing to be decidedly higher than its fellow. This may actually be the case on account of difference

in the length of the legs, but usually the difference is only apparent, and caused by the sharp deviation of the trunk from the median line. Inspection from the front will often show the inequality of the hips to a greater extent

tance from the umbilicus, the one on the side of the dorsal convexity being higher up. A large number of cases of scoliosis show also great flattening of the plantar arch, and, at times, have very pronounced flat-foot. This point should



Fig. 2.—Lateral curvature of spine, with marked rotation. (*R. H. Sayre.*)

than when viewed from the back. It will also be found that the breast on the side of the dorsal convexity is almost always smaller than its fellow. There is also, usually, a difference in their dis-



Fig. 3.—Lateral curvature of spine, with marked rotation. (*R. H. Sayre.*)

always be investigated, and calls for treatment, as it is impossible to preserve an erect carriage of the trunk if the feet upon which the trunk rests are not in good condition.

The patient should now bend forward, keeping the legs straight, and letting the hands hang perpendicularly toward the floor. In this position the scapulæ are drawn, the hips left better exposed to view than when the patient is upright, and small amounts of rotation of the spine can thus be made out, which might escape observation if the patient were examined in the upright posture only.

It might be supposed that conditions that have such radical differences in their pathology as scoliosis and Pott's disease could not be confounded, but lateral deviation of the spinal column occurs in the latter disease, and at times the deformity so closely resembles a true scoliosis as to deceive even those of large experience. The occurrence of muscular spasm, associated with pain on movement or with elevation of temperature, should cause a provisional diagnosis of spinal tuberculosis. Rest and protection of the spine should be tried and gymnastics rigorously prohibited.

Records should be kept of the condition of the patient, as it is impossible, otherwise, to judge of the progress of a case. The age, weight, height, circumference of the chest, and length of the limbs certainly should be noted. A photograph also should be taken with both front and rear views, and at times a profile. With the patient lying prone upon the floor or some hard surface, the contour of the back should be taken at various points, by means of a flexible lead tape, and the tracing transferred to a permanent record. In taking subsequent tracings, or rephotographing the patient, care should be taken to reproduce as nearly as possible the same conditions as those under which the first photographs or measurements were made. Otherwise there is great danger of the physician deceiving himself in

regard to the progress of the case, as it is quite easy to place the patient in different positions on the same day, and get very different results from either the photograph or tracing.

The apparatus of Beely, of Berlin, and the Zander machine for taking diagrams of the thorax are very useful methods of recording the results of such observations, but the majority of practitioners will not find time for their use.

Pathology.—The pathology of incipient cases of scoliosis is deduced chiefly from examination of subjects who have died in advanced stages of the disease, as it itself is not fatal, and opportunities to examine incipient cases rarely present themselves. It is probable that the early changes are in the intervertebral disks, which become compressed on one side, and so destroy the erect posture of the spine. In consequence of the bending of the spine away from the median line, compensating curves occur in the opposite direction at those points of the spine remote from the original curvature, in order to restore, as far as possible, the equilibrium of the trunk. From the fact that the spinous processes are fastened more or less securely together by the intraspinous ligaments, lateral flexion of the spine is always accompanied by more or less rotation of the vertebræ on themselves, and this normal rotation, which becomes very much accentuated in scoliosis, is the most difficult factor with which we are called upon to deal.

In the more advanced cases of scoliosis the deformity involves not only the intervertebral substance, but the entire vertebræ. The bodies of the vertebræ show unequal development of their two component halves, and the spinous processes, instead of projecting straight to the rear of the body, bend more or less

sharply to one side or the other, according to the curve. The bodies of the vertebrae are also very frequently wedge-shaped, one side being twice the height of the other, and not infrequently large osteophytes are thrown out which at times firmly join several vertebrae together, producing an ankylosis, and at other times encroach so much upon the intervertebral foramina as to cause very painful neuralgias.

In these advanced cases the ribs also

cases of lateral curvature the typical rachitic pelvis is readily distinguished.

The rotation of the front part of the body of the vertebrae is toward the side on which the convexity exists, and may be so great that a line passed through the spinous process and central part of the body of the vertebrae may be parallel with one through the fifth lumbar, and yet at right angles to a line passing in a similar manner through the middorsal region.



Fig. 4.—Method of making pressure on projecting ribs to correct rotation in lateral curvature of the spine. (R. H. Sayre.)

participate in the deformity, the angles of the ribs on the side of the convexity being very much more accentuated than is normal, while the ribs themselves often droop so far toward the pelvis as to pass inside of its brim. The ribs may occasionally overlap each other, giving rise to great pain, and even, at times, to periostitis.

Not infrequently these bone-changes extend to the pelvis itself, and in many

Treatment.—Treatment consists, first, in removing any defect which may exist, which predisposes the patient toward a scoliosis. If the case be one due to paralysis, and it is not possible for the patient voluntarily to hold the body in the upright posture, artificial means must be employed to maintain it in an erect position. The same is true in some cases of rachitic scoliosis which require support, exactly as cases of bow-

leg or knock-knee require support until the soft stage of rickets has passed and the bones have become hard once more.

If the patient is distorted to any appreciable extent, force must be used to press the bones back toward the straight

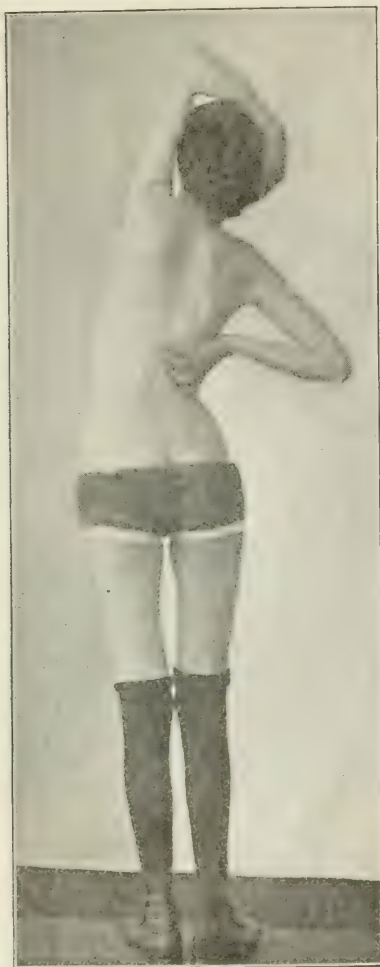


Fig. 5.—Palm of hand against projecting ribs and hand of hollow side across top of head. Endeavors to bulge out hollow side. (R. H. Sayre.)

line as far as possible. In doing this, both longitudinal traction and rotation are necessary. The most convenient method of employing longitudinal trac-

tion is for the patient to suspend herself partially by means of a head-collar fastened to a cross-bar and hanging from a beam by a compound pulley, the end of the pulley-rope being held by the patient, who, keeping her arms extended to their fullest extent, lifts herself by degrees, hand over hand, until her heels are clear of the floor, thus suspending almost the entire weight of the body on her head and arms. The hips should now be grasped, either in a clamp or between the surgeon's knees, and the trunk twisted around its longitudinal axis, so as to reduce the deformity. In some cases the patient is lain prone on a firm couch, and traction made on the head and feet by means of pulleys. The surgeon then presses with great force on the projecting ribs, endeavoring to force them toward the normal. (See Fig. 4.) In correcting rotations of this sort, attention must be paid to the anatomical relation of the ribs and vertebræ, pressure being directed so as to rotate the vertebræ around the longitudinal axis in the proper direction, as shown in Fig. 5, mere lateral pressure against the side (as shown in Fig. 6) tending to increase rather than decrease the angular deformity of the ribs.

In very severe cases the patient should be anesthetized, and forcible correction of the vertebræ employed, as described above, a plaster-of-Paris jacket being applied to the patient while in the prone and stretched position, the frame on which she rests being moved from the padded couch on which traction was made, and supported by its extremities alone, in order that the plaster jacket may be more easily applied.

In ordinary cases, where a plaster jacket is necessary, it is much more readily applied in the upright position than prone.

In applying plaster-of-Paris bandages in cases of lateral curvature, a shirt of double length is used, pads are placed inside the shirt over the mammæ and outside the shirt over the iliac crests, and a strip of tin two inches wide is placed next the skin from the sternum to the pubes, on which to cut off the plaster; and, instead of being suspended by the head and axillæ, the patient suspends herself by pulling on the free end of the rope which passes from the head-swing over the pulley, while she keeps the arms outstretched, the upper hand being on the concave side. The surgeon, sitting behind the patient, applies the bandages as in a case of Pott's disease. As soon as the plaster is set, which should be the case by the time the corset is finished, it is split open down the front and removed while the patient is still suspended. A thin slice is then taken from each edge of the slit and the corset held together by a roller bandage and dried. When dry, the next day, it is put on the patient while again self-suspended, and fastened by a roller bandage; then trimmed out under the arms and above the thighs until comfortable, and removed. The extra length of shirt is then reversed over the jacket and sewed to itself, covering in all the plaster, and lacings are sewed on in front. The latter are sewed through and through the plaster of Paris, a shoemaker's awl being used to make the holes through which the needle passes. If the patient is very heavy it is well to reinforce the strength of the corset by putting a thin strip of steel under the leather which holds the hooks.

Plaster-of-Paris jackets should not be covered with shellac or varnish, as it renders them impervious to the insensible perspiration, and so makes them hot, unhealthy, and uncomfortable.

If the case is very badly deformed, it is expedient to put padding inside of the shirt when it is reversed, in order to make the corset as symmetrical as possible, and thus avoid the necessity of padding the clothes.

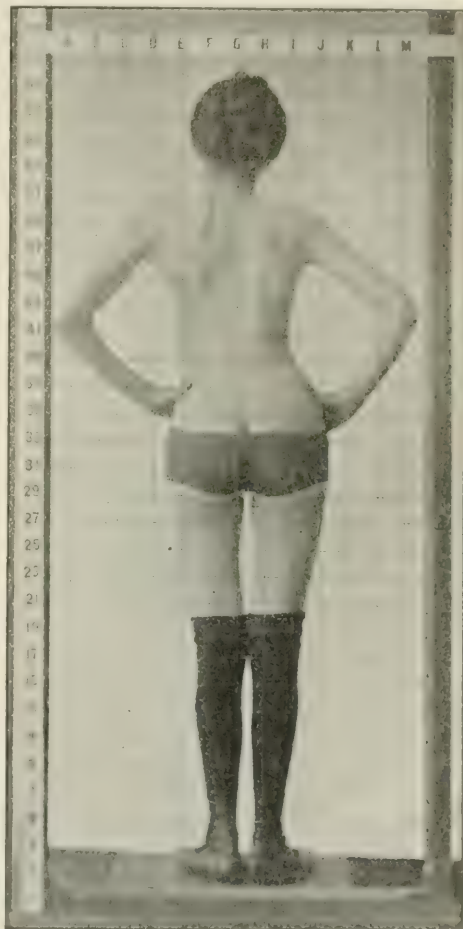


Fig. 6.—Standing, hands on hips, patient endeavors to bulge out the hollow side and simultaneously to untwist the rotation. (*R. H. Sayre.*)

The corset having been made while the patient is stretched out, it should always be applied to the patient in this position. For this purpose, the patient is provided with a pulley-wheel and

head-swing at home, by which she can suspend herself in the morning, while the corset is applied by some member of the family, and retained in position by lacings joining the hooks on the front of the jacket. The lacing should pass first

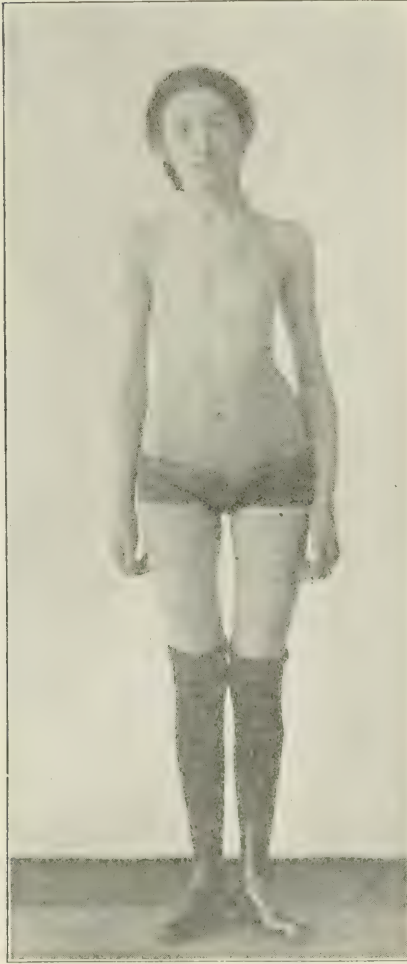


Fig. 7.—After forcible correction with plaster-of-Paris jacket and gymnastics. (*R. H. Sayre.*)

around the two central hooks at the waist, and then run down to the bottom, be reversed, and pass up again to the top. Applied in this manner, the corset

fits better than if the lacing is begun at either end. It is a mistake to cut corsets down in two places, as I have frequently seen done, neither should it be made so stiff as to render it impossible to remove it unless it is thus cut in two pieces.

If support is to be used, a plaster-of-Paris jacket is the most useful, in my experience. The various forms of elastic supporting braces fail to accomplish that which they were designed to effect, and

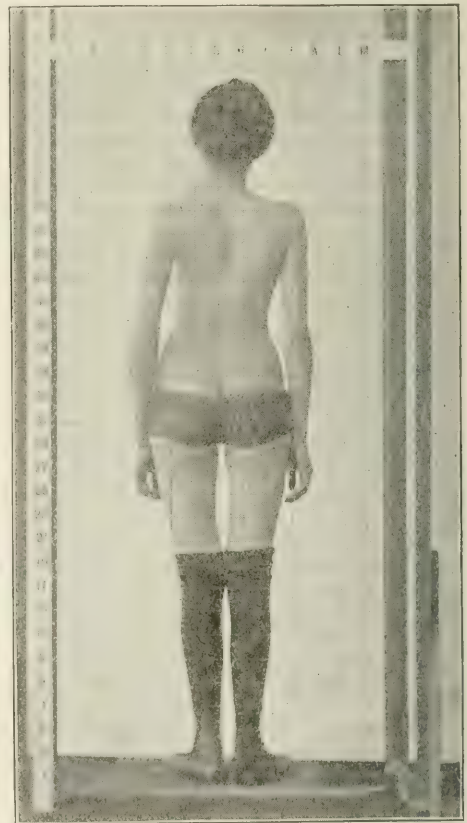


Fig. 8.—After forcible correction with plaster-of-Paris jacket and gymnastics. (*R. H. Sayre.*)

that they must fail to do so is readily seen by anyone who will contemplate the great mechanical difficulties which have to be met in controlling the motions of

the large number of joints which compose the spine.

If a patient requires a permanent support on account of very marked deformity or paralysis, a wood jacket is somewhat lighter than one made of plaster of Paris, although it will be found hotter. The wire corset is cooler than the wood, but not so light, and both require much more time and trouble to manufacture than does the plaster of Paris. The same is also true of the aluminum corset, while celluloid forms a very pretty support, but one so intensely hot as rarely to be endured.

Literature of '97-'98-'99.

In lateral curvature the support is to be applied for the purpose of fixation and extension during the time the individual is in an erect position, but is to be removed at night, and gymnastics with proper breathing exercises are to be practiced morning and night. These exercises should be done while the patient has on the support. Nearly all cases of lateral curvature of the spine in which the deviation from the median line is more than one-half of the diameter of the body of the vertebræ should be braced. The aluminum corset is an ideal spinal support. A. M. Phelps (Med. Register, Apr. 15, '99).

The key to success in all cases of lateral curvature, however, lies in developing the patient's own ability to hold the body in as improved a position as possible, and he who contents himself with any kind of support has but half-done his duty toward himself and his patient. To be effective, exercise must be so carried on that the patient learns instinctively to help herself at all times during the twenty-four hours, and not merely to preserve an erect carriage while in the doctor's office. Any system which fails to arouse the patient's interest and stimulate her desire to im-

prove herself as far as possible by constant, unrelenting effort will fall short of attaining the result sought for.

The following set of exercises will be found useful for the majority of cases of lateral curvature, but the success which attends their application will be dependent on the amount of enthusiasm with which the individual patient can be imbued.

While self-suspension, in the manner indicated, is a most useful means of diminishing the curvature of the spine, it is not practicable for a patient to suspend herself for a long period of time; and it is wise to supplement it by suspension by means of a weight and pulley attached to a chin-piece, which is fastened to the patient's head while she lies on her back on an inclined plane which is slightly convex.

In correcting the rotation, which, as before remarked, is a vastly more prominent element in the production of deformity than the lateral deviation of the spine, great benefit is derived from placing the patient face downward upon the floor or a firm table covered with a thick rug, while the physician makes strong pressure upon the projecting scapula, pushing in a direction forward and away from the central line of the body, so as to rotate the vertebræ toward the median line. In some cases the patient is allowed to lie for half an hour in this position with a sand-bag weighing twenty or thirty pounds resting upon the shoulder, if it can be placed so that the weight falls in the proper direction.

In beginning the exercises a mat or thick shawl is laid on the floor and the patient lies prone, the arms at right angles to the trunk, palms down, face turned to the convex side, and the back as straight as possible. The patient supinates the hands, throws the scapulæ

well back, raises the hands from the floor, and lifts the trunk, while the surgeon holds the feet down. This is repeated three times; later on it can be done oftener. The breath should not be held during any of these exercises, but the patient should breathe naturally. If necessary to secure this, make them count aloud while exercising.

With the hands behind the head, the patient raises the elbows from the floor, and raises the trunk as before, the feet being held by the surgeon.

With the hands behind the head and the elbows raised, the body is swayed toward the convex side, the patient trying to "pucker in" the bulging ribs and *not* to bend in the lumbar concavity. The feet are fixed as before.

With the arm on the side of the convexity under the body, the other arm over the head, the heels fixed, the patient raises the trunk from the floor.

Sometimes the arm on the side of the concavity is put on the opposite buttock, while the patient raises the trunk. Sometimes the arm on the convex side is put on the buttock, and in cases of marked lordosis, with great stooping of the shoulders, both hands are put on the buttocks while the patient raises the trunk.

The patient now lies on the back, arms at the sides, palms up, and lifts first one foot in the air, while the surgeon makes resistance graduated to the patient's power; repeated, say, five times. The same is done with the other foot, and then with both. The feet are next separated and then brought together once more while the surgeon resists. Each leg then describes a circle, first from within out, then from without in.

If there is special weakness at the ankles, with a tendency to flat-foot, the patient flexes the foot and extends it

against resistance, and turns the sole of the foot toward its neighbor, the surgeon resisting; and it is then forcibly everted again by the surgeon, the patient resisting.

The patient now lifts the arms from the sides, passing perpendicularly to the floor till they are stretched as far beyond the head as possible, and then, going at right angles to the trunk and parallel with the floor, returns them to the sides, palms up.

When the heels are held, the patient rises to the sitting position, hands at the sides; then she rises from the floor with the hands behind the head and the elbows at right angles to the trunk.

The patient now stands with the heels together, toes turned slightly out, hands behind the head, elbows at right angles to the trunk; then rises on tip-toe, bends the knees and hips, keeping the back as straight and erect as possible, and rises up once more. With the arm on the concave side high above the head, the arm on the convex side at right angles to the body, she rises on tip-toe, bends the hips, knees, and ankles so as to squat, then rises and stands. All this time care must be taken to push the body as straight as possible, and gradually to educate the patient to hold it so without wriggling during these movements.

Let the patient practice walking in these positions, both on the flat foot and tiptoe, and also step high, as if walking upstairs. With the palm of the patient's hand on the convex side against the ribs, pushing them in, the other hand on the concave side, she pushes a slight weight up in the air, while the body swings so as to straighten out the curves.

The surgeon should sit behind the patient, fix her thighs with his knees, while she holds both arms above the head and bows toward the floor, keeping her knees

stiff while the operator keeps her ribs as straight as possible with his hands.

With the arm on the concave side across the top of the head, and the arm on the convex side around in front of the abdomen, the patient bends to the convex side through the ribs and *not* through the waist.

The patient sitting with the back toward the surgeon, the latter pushes one hand against the most projecting part of the convexity, and, with the other hand passed under the shoulder of the concave side, straightens out the curve as much as possible, the hand on the "bulge" acting as a fulcrum in straightening the curve.

The patient sits on a stool in front of the surgeon, who fixes the pelvis with his knees. The patient then twists the projecting shoulder to the front while the surgeon holds the elbows, which are at right angles to the trunk, the hands being behind the head, and makes resistance. In the same position the patient swings forward and back, swinging through the hips, keeping the back stiff, and not bending in the waist.

The patient pushes in the ribs on the convex side with the hand, and pushes up with the hand on the concave side, the same as when standing. She also lifts the arm on the concave side up at right angles with the body while holding a weight.

In cases of round shoulders, wind-mill motions of both arms and to-and-fro movements of the head against resistance are advisable.

The patient lies prone on the couch, all the body above the waist projecting from it, while the surgeon holds the heels. With the hands behind the head, the elbows thrown back, the body is bent toward the floor, then raised up; later on, resistance is made by the sur-

geon. The patient lies on the concave side and rises up laterally. The patient lies with the convexity on the edge of the couch, and hangs off as far and as long as possible.

The patient stands bent forward as if playing leap-frog, her hands on a chair, while the surgeon, with one hand under the shoulder on the convex side and one hand on the projecting ribs, corrects the rotation. It is advisable to steady the patient with the knee while doing this.

Spinal Localization.

In localizing lesions of the spinal cord the latter is regarded as being made up of a number of segments, each named with reference to the nerves which have their origin from this part of the cord; thus the first dorsal segment is that from which the first pair of dorsal nerves take their origin. It must be recollected that these nerves do not issue from the spinal canal directly opposite the segment from which they arise, but lower down, the distance below varying in different parts of the spine, but becoming greater the lower down the spine the injury is located.

We judge of the location of the injury in the cord, first, by the motor paralysis that is present; second, by the cutaneous anæsthesia; and, third, by the condition of the reflexes.

In the accompanying table from Keen are shown the various spinal segments, the muscles innervated by each, and the part of the body supplied by sensation, as well as the reflexes (next page).

Tumors of the Spinal Cord.

Tumors of the spinal cord were considered beyond the surgeon's reach till Gowers and Horsley in 1887 reported a successful case in which the diagnosis had been made from nerve symptoms without the presence of any external tumor.

LOCALIZATION OF THE FUNCTIONS OF THE SEGMENTS OF THE SPINAL CORD.

SEGMENT.	MUSCLES.	REFLEX.	SENSATION.
Second and third Cervical.	<ul style="list-style-type: none"> Sterno-mastoid. Trapezius. Scaleni and neck. Diaphragm. 	<i>Hypochondrium?</i> (third to fourth cervical). Sudden inspiration produced by sudden pressure beneath the lower border of ribs.	Back of neck and of head to vertex. (Occipitalis major and minor, auricularis magnus, superficialis colli, and supraclavicular.)
Fourth Cervical.	<ul style="list-style-type: none"> Diaphragm. Deltoid. Biceps. Coraco-brachialis. Supinator longus. Rhomboid. Supraspinatus and infraspinatus. 	<i>Pupillary</i> (fourth cervical to second dorsal). Dilatation of the pupil produced by irritation of the neck.	Neck. Shoulder, anterior surface. Outer arm. (Supraclavicular circumflex, musculo-cutaneous, or external cutaneous.)
Fifth Cervical.	<ul style="list-style-type: none"> Deltoid. Biceps. Coraco-brachialis. Brachialis anticus. Supinator longus. Supinator brevis. Deep muscles of shoulder-blade. Rhomboid. Teres minor. Pectoralis (clavicular part). Serratus magnus. 	<p><i>Scapular</i> (fifth cervical to first dorsal). Irritation of skin over the scapula produces contraction of scapular muscles.</p> <p><i>Supinator longus</i> (fourth to fifth cervical). Tapping the tendon of the supinator longus produces flexion of forearm.</p>	Back of shoulder and arm. Outer side of arm and forearm to wrist. (Supraclavicular circumflex, musculo-cutaneous, or external cutaneous, internal cutaneous, radial.)
Sixth Cervical.	<ul style="list-style-type: none"> Biceps. Brachialis anticus. Subscapular. Pectoralis (clavicular part). Serratus magnus. Triceps. Extensors of wrist and fingers. Pronators. 	<p><i>Triceps</i> (sixth to seventh cervical). Tapping elbow-tendon produces extension of forearm.</p> <p><i>Posterior wrist</i> (sixth to eighth cervical). Tapping tendons causes extension of hand.</p>	Outer side and front of forearm. Back of hand, radial distribution. (Chiefly musculo-cutaneous, or external cutaneous, internal cutaneous.)
Seventh Cervical.	<ul style="list-style-type: none"> Triceps (long head). Extensors of wrist and fingers. Pronators of wrist. Flexors of wrist. Subscapular. Pectoralis (costal part). Serratus magnus. Latissimus dorsi. Teres major. 	<p><i>Anterior wrist</i> (seventh to eighth cervical). Tapping anterior tendon causes flexion of hand.</p> <p><i>Palmar</i> (seventh cervical to first dorsal). Stroking palm causes closure of fingers.</p>	Radial distribution in hand. Median distribution in palm, thumb, index, and one-half middle finger. (Musculo-cutaneous, or external cutaneous, internal cutaneous, radial, median.)
Eighth Cervical.	<ul style="list-style-type: none"> Triceps (long head). Flexors of wrist and fingers. Intrinsic hand-muscles. 		Ulnar area of hand, back, and palm. Inner border of forearm. (Internal cutaneous ulnar.)
First Dorsal.	<ul style="list-style-type: none"> Extensors of thumb. Intrinsic hand-muscles. Thenar and hypothenar muscles. 		Chiefly inner side of forearm and arm to near axilla. (Chiefly internal cutaneous and nerve of Wrisberg or lesser internal cutaneous.)

LOCALIZATION OF THE FUNCTIONS OF THE SEGMENTS OF THE SPINAL CORD (*concluded*).

SEGMENT.	MUSCLES.	REFLEX.	SENSATION.
Second Dorsal.			Inner side of arm near and in axilla. (Intercostohumeral.)
Second to twelfth Dorsal.	Muscles of back and abdomen. Erectores spine.	<i>Epigastric</i> (fourth to seventh dorsal). Tickling mammary region causes retraction of the epigastrium. <i>Abdominal</i> (seventh to eleventh dorsal). Stroking side of abdomen causes retraction of belly.	Skin of chest and abdomen in bands running around and downward, corresponding to spinal nerves upper gluteal region. (Intercostals and dorsal posterior nerves.)
First Lumbar.	Ilio-psoas. Rectus. Sartorius.	<i>Cremasteric</i> (first to third lumbar). Stroking inner side of thigh causes retraction of testicle.	Skin over groin and front of scrotum. (Ilio-hypogastric, ilio-inguinal.)
Second Lumbar.	Ilio-psoas. Sartorius. Quadriceps femoris.		Outer side of thigh. (Genito-crural, external cutaneous.)
Third Lumbar.	Quadriceps femoris. Anterior part of biceps. Inward rotators of thigh. Abductors of thigh.	<i>Patellar</i> (third to fourth lumbar). Striking patellar tendon causes extension of leg.	Front of thigh. (Middle cutaneous, internal cutaneous, long saphenous obturator.)
Fourth Lumbar.	Abductors of thigh. Adductors of thigh. Flexors of knee. Tibialis anticus. Peroneus longus.	<i>Gluteal</i> (fourth to fifth lumbar). Stroking buttock causes dimpling in fold of buttock.	Inner side of thigh, leg, and foot. (Internal cutaneous, long saphenous obturator.)
Fifth Lumbar.	Outward rotators of thigh. Flexors of knee. Flexors of ankle. Peronei. Extensors of toes.	<i>Achilles tendon</i> (fifth lumbar to first sacral). Over-extension causes rapid flexion of ankle, called ankle-clonus.	Back and outer side of leg; dorsum of foot. (External popliteal, external saphenous, musculo-cutaneous plantar.)
First and second Sacral.	Flexors of ankle. Extensors of ankle. Long flexor of toes. Intrinsic foot-muscles.	<i>Plantar</i> (fifth lumbar to second sacral). Tickling sole of foot causes flexion of toes and retraction of leg.	Back and outer side of leg, sole, dorsum of foot. (Same as fifth lumbar.)
Third, fourth, and fifth Sacral.	Gluteus maximus. Perineal. Muscles of bladder, rectum, and external genitals.	Vesical centres. Anal centres.	Back of thighs, anus, perineum, external genitals. (Small sciatic, pudic, inferior hemorrhoidal, inferior pudic.)
Fifth Sacral and Coccygeal.	Coccygeus muscle.		Skin about the anus and coccyx. (Coccygeal.)

These tumors may be extradural or intradural. There have been reported lipoma, osteoma, fibroma, sarcoma, myxoma, psammoma, carcinoma, tubercle, parasitic cysts, callus from old fracture, and connective-tissue formations. Gummata are usually capable of removal by constitutional treatment. Carcinoma is usually secondary to carcinoma elsewhere and generally inoperable.

Literature of '97-'98-'99.

Study of tumors of the spinal cord, based upon fifty-six personal observations and the published cases. Of the tumors involving the spinal cord 57.7 originated in the vertebræ, and 42.3 were of intravertebral origin. Of the whole number, about one-fifth were intramedullary, and about one-tenth grew from the membranes, nerve-roots, and cauda equina. In 400 cases growing within the spinal canal, and not from the vertebræ, the following was the order of frequency: Sarcoma, 107; tubercle, 64; echinococcus, 44; fibroma and neurofibroma, 33; gumma, 28; glioma, 20. In 115 of the 400 cases the tumors were multiple. In about one-third of all the cases operation was possible. The fact that primary tumors of the cord and meninges do not give rise to metastases was confirmed. In children under ten years the most common tumors were tubercle, lipoma, and sarcoma. From the tenth to the fortieth years, tubercle, glioma, sarcoma, and hydatid cysts were the most common growths. In later life gumma was the most common intramedullary tumor. Injury is thought to be an important etiological factor. Fischer (Beit. f. Klin. d. Rückenmarks u. Wirbeltumoren, '98).

Symptoms.—The symptoms will vary according to the location of the tumor; they are pain, motor paralysis, and sensory paralysis.

Pain is usually the earliest symptom and is often mistaken for rheumatism, but should be differentiated from this by not affecting various joints, and by its

gradual onset. Muscular spasm is associated with many cases. In a large percentage we find anæsthesia on the side opposite to the tumor, while hyperæsthesia is present on the same side as the growth, associated with ataxia, motor paralysis, and exaggerated reflexes on account of the fact that the motor and sensory fibres of the cord cross at different levels. The pain is referred to a level below the tumor, and care should be taken to explore the cord higher up than the tumor was supposed to exist in case it is not discovered at this point. There is apt to be rigidity of the spine partly from pain and partly from muscle-spasm.

Paralysis may be caused by pressure simply or from myelitis, hæmorrhage into the cord, or infiltration of the tumor, and is usually gradual in its onset. Motor paralysis progresses from above downward, while the paralysis of sensation begins at the feet and ascends. The reflexes are exaggerated in the outset and diminish later on. Retention and incontinence of urine take place, accompanied by cystitis, paralysis of the rectum, and bed-sores, and the usual chain of symptoms of cord involvement come on when the paralysis has become more pronounced. The diagnosis of tumor must be based on involvement of the spinal cord with the exclusion of other cord diseases, the site being diagnosed by means of the symptoms exhibited by various parts of the body, keeping always in mind the possibility of the tumor being multiple.

Literature of '97-'98-'99.

The diagnosis of malignant disease of the spine is readily made in cases in which a malignant growth has already occurred in another part of the body; but, if the primary manifestation is in the spine, the affection may be overlooked. The growth may infiltrate the

bodies, transverse processes, laminæ, and spines, or occur externally on the sides of the vertebræ. Small metastases may occur in the neighborhood, and the spinal nerves may be oppressed by invasion of the intervertebral foramina. The average duration of life after the onset is eight months. The most constant symptoms are pain and motor paralysis. Kyphosis is found in some cases. Severe pain and the occurrence of sensory paralysis before the appearance of the motor symptoms are considered as rather characteristic. T. H. Myers (Medical Chron., Mar., '98).

Except in the case of gummata, the prognosis is fatal without operation, and the latter should therefore be undertaken unless the condition of the patient is such as to render it hopeless even if the tumor is located and found capable of removal.

Literature of '97-'98-'99.

Three original cases of morbid growths of the spinal cord treated by surgical operation are noted; also a table of 33 other cases of a like kind collected from various sources. In 10, perhaps 12, of these cases the operation seems to have hastened death; in 9 cases the surgical treatment made little difference in the progress of the case. In 10 cases the operative treatment is reported to have led to recovery; but in 2 of these cases the records are not sufficiently perfect to allow of verification of the statement. Putnam and Warren (Amer. Jour. Med. Sci., Oct., '99).

Spina Bifida.

Spina bifida is a congenital malformation of the spine analogous to and often associated with harelip, cleft palate, and bifid uvula, which is due to defective development of the ovum. A vertebra develops from four primary centres: two for the body, which make their appearance at the eighth week, and one for each lamina, appearing at the sixth week. If the laminæ fail to unite in the median

line, a gap in the bony structure of the spine exists through which the cord and its membranes may protrude, forming a tumor on the back. Occasionally, but very rarely, there is a failure to unite between the two halves of the body of a vertebra and in this way an anterior spina bifida may result.

The gap caused by the failure of the laminæ to unite may be small and confined to one vertebra, or may involve almost the entire width of the laminæ and extend the entire length of the spinal column.

Now and then there is a defect in one or more vertebræ without protrusion of the membranes or cord and we have what is called *spina bifida occulta*, as there is no tumor to be seen. This condition is apt to be overlooked, but its existence should be suspected in persons with congenital disturbances of function of the lower limbs, especially if associated with imperfect control of the sphincters. If there is a hairy patch on the spine, the probabilities of a *spina bifida occulta* being present are much increased.

In the ordinary spina bifida the contents of the spinal canal protruding through the gaping laminæ form a tumor in the median line of the back which may vary in size from a hardly appreciable button to a mass as large as a foot-ball. At times there is a narrow constricted base with a well-marked pedicle and at others the tumor lies flat on the back. This tumor may be covered with tough, thick skin, usually, however, the contents of the tumor press upon the skin until it is changed to a thin, translucent envelope through which the contents of the sac may be seen with more or less distinctness. The fluid which fills the sac is the same in character as the cerebro-spinal fluid. Often spina bifida

is associated with hydrocephalus, and sometimes, in such cases, if pressure be made on the tumor a sense of fullness will be communicated to the fingers held against the anterior fontanelle. The action of gravitation can also be seen at times, the child's head swelling when it is laid down and the spinal tumor growing larger when the child is placed upright.

There are three recognized classes of spina bifida, divided according to the character of the contents of the sac: If the membranes of the cord alone protrude through the opening in the arches, then the tumor is called a *meningocoele*. Should both the membranes and the cord, with its appertaining nerves, protrude, we have a *meningomyelocoele*. Should the central canal of the cord become distended with fluid and push before it both membranes and cord, we have a *syringomyelocoele*, or a condition known as *syringomyelia*.

It is by no means easy to make an absolute diagnosis as to the kind of tumor that presents except in the rare cases where the sac is so extremely thin that the outlines of the nerves can be made out. The failure to see nerve-roots through the sac-wall, however, by no means proves that they are not there, and it is usually impossible to say this positively before operation; but if there is marked involvement of the sphincters, with paralysis and atrophy of the lower extremities, it is almost certain that the case is a *meningomyelocoele*.

Prognosis.—The prognosis will vary in different cases. At times the tumor is of small size and the child's general condition is good; but in other cases there is a great defect in the tone, the tumor is enormous, the lower extremities are paralyzed, there is little or no control over the sphincters, and frequently the

intelligence is almost lacking. Some of these very bad cases fortunately die soon after birth.

Treatment.—Treatment will vary with the conditions that present themselves. If the tumor is small and covered by strong, thick skin, it may in time diminish in size, the child's condition may improve, and nothing be required but protection from traumatism by a shield of metal or celluloid. If the skin is thin, it is sometimes found useful to paint it frequently with tannin collodion, which serves to thicken and toughen it.

In case the child does not improve in the control of its muscles, or if the skin covering the sac grows so thin as to threaten rupture, operative interference should be tried. This may consist either in aspirating the fluid and injecting something to cause contraction of the sac or in excising the sac and closing the gap as well as practicable.

In 1848 Brainard, of Chicago, reported a series of cases in which he had successfully injected a watery solution of iodine and iodide of potassium. Later on Morton advocated the use of an injection in which glycerin was used as being less apt than either water or alcohol to permeate the cerebro-spinal fluid with rapidity and so cause convulsions. Morton's fluid consists of iodine, gr. x; iodide of potassium, gr. xxx; and glycerin, f5j. With an hypodermic needle passed through the healthy skin into the sac a half-drachm or so of fluid is drawn off and an equal amount of the iodoglycerin fluid injected. Pressure is applied during the operation to prevent, if possible, the fluid from entering the spinal canal. The puncture is then covered with collodion and cotton and gentle pressure made on the sac. In a few days, if all symptoms of irritation have subsided, the injection may be repeated. The statistics

which have been collected on several occasions show that more favorable results have attended the injection of Morton's fluid than any other method of treatment; but in comparing these statistics with those of excision it must be remembered that most of the latter date from the days when aseptic surgery was not understood as it is now and many cases died of sepsis in consequence; in addition

than the tumor to avoid the too sudden escape of cerebro-spinal fluid. Incisions are made to include the thin skin covering the sac. If the latter have a small pedicle it may be ligated. If the sac have a wide base it should be opened and removed, enough of it being left to cover the opening without tension. Operators are divided as to whether or not efforts should be made to separate nerve-fibres



Fig. 9.—Hydrocephalus.



Fig. 10.—Club-foot.

to this the technique of the operation was comparatively imperfect. In consequence of greater familiarity with the operation and knowledge of how to avoid suppuration the recent statistics of excision show great improvement, and there is no question that in many cases it is the operation to be preferred and in some the only possible operation.

The child is placed with the head lower

if the latter are found spread over the inner surface of the sac or whether they should be removed with the latter. If they can be separated from the sac with ease they should be so separated and returned to the spinal canal. If, however, they are so intimately adherent to the sac as to make this difficult, no effort should be made to save them, as numerous cases are reported where the nerves

spread on the inner surface of the sac have been removed with the latter with no bad results. After closing the membranes efforts should be made to close the gap in the bones if possible. To effect this object various plans have been tried. The periosteum from the side of the canal has been dissected up and brought across as a flap and stitched to a similar flap of periosteum raised from the opposite side of the spinal canal. Flaps of bone have been chiseled from the ilium or sacrum when the defect is low down or from the transverse processes when it is higher up, and these flaps turned over, like hinges, and sewed to others taken in a similar manner from the opposite side, the periosteal surfaces being turned toward the cord.

In the dorsal region flaps have been taken from adjacent ribs and pushed through the erector-spinae muscles and sutured to flaps from the other side. Portions of the scapula of the rabbit have been employed to cover the gap in the bone and flaps of the periosteum of a rabbit's scapula have been sewed to the periosteum on the edges of the gap. Plates of celluloid have also been employed to stop the gap. In some cases the bone-gap is so extensive that no efforts to repair it are made, and in any case the operation is completed by joining skin flaps in the median line. If the tumor has had a very broad base and the skin has been very thin it may be necessary to slide the skin from both sides of the trunk in order to make the flaps meet.

The fundamental principle to be carried out is practically the same as in an ordinary operation for hernia, and the effort should be made, as far as possible, to sew together the various tissues covering the spinal canal, each to its fellow in their own proper relation. The causes

of mortality in the past have been shock and convulsions following the immediate removal of a large amount of cerebro-spinal fluid, the patient's head not having been kept lowered, and septic meningitis on account of faulty technique.

Literature of '97-'98-'99.

Any case of spina bifida may be operated on with a fair chance of success. If the neck of the sac is small, it is sufficient to pass a ligature about it. In larger sacs rows of catgut suture are employed. Long flaps of skin and mesoblastic tissue are used to close in the gap. The sutures are applied in such a manner that the redundant margins of the mesoblastic flaps are curled inward just as the cut margins of intestine are curled inward by a Lembert suture. The skin is sutured in a similar manner, but its edges are turned outward. The ridges thus formed in the median line add to the strength of this posterior covering of the spinal canal. Of 32 patients operated upon, 25 recovered. Micoll (*Brit. Med. Jour.*, Oct. 15, '98).

In the treatment of spina bifida stress is laid on the following points: 1. The position of the patient should be lying on the side with the head low. 2. The first incision should in all cases be a lateral one. 3. It is a distinct advantage to retain the fluid in the sac, or replace it by irrigation during the separation of the cord, etc., from the skin. 4. The insertion of the sponge to prevent leakage from the canal during operation. 5. The liberating lateral incisions to enable the aponeurotic coverings to be glided into a position of complete approximation over the canal, and to be retained there by sutures without the tension which would otherwise exist. 6. The operation is applicable to cases of meningo-myelocele. 7. The use of a small drainage-tube for a few days between the dura mater and aponeurotic covering is advisable in case leakage of cerebro-spinal fluid occurs. Pearson (*Brit. Med. Jour.*, Nov. 5, '98).

In hydrocephalus it has been proposed to drain off the cerebro-spinal fluid by

tapping through the spinal column instead of by way of the orbit or anterior fontanelle. If this method is adopted the needle of the aspirator should be introduced in the median line between the sacrum and the last lumbar vertebra by preference, as the opening between the bones is larger here than higher up. The needle may, however, be introduced between the fourth and fifth or third and fourth lumbar vertebræ. It should not be inserted higher.

This same treatment has been tried in cases that seemed to be tubercular meningitis, with the result that the patient survived.

Parkin proposes to trephine the occipital bone and so gain access to the subarachnoid space and by aspiration relieve the intracranial pressure in these cases. The prognosis without operation is so universally fatal that the occasional successes that have followed these procedures render them worthy of trial.

Wounds and Injuries of the Spine.

Gunshot and Punctured Wounds.—

Bullet wounds of the spine are not necessarily fatal, and whether or not the bullet should be removed will depend largely upon its location. The x-ray here serves a most useful purpose in locating the bullet, pictures being taken in two diameters of the body, or preferably, with copper points superimposed on the trunk, so that the actual distance of the bullet from the surface of the body may be accurately determined.

If the bullet is in an accessible position, it should be removed. It may, however, lie in such relation to the intrathoracic viscera as to make such a proceeding most hazardous, and, unless the wound of entrance has become infected by clothing or injudicious probing, it is well, in such cases, not to interfere. In any surgical interference, the strictest cleanli-

ness must, of course, be observed, and Girdner's telephonic probe may be employed to advantage in exploring for the bullet.

The concussion of modern high velocity projectiles causes, at times, a temporary paralysis, even when the wound is insignificant. But this soon passes away when the cord has been uninjured.

If the cord is compressed by fragments of bone, or blood, or the bullet, it should be freed from pressure by operation. If the bullet has passed through the body, but injured the cord in transit, it is proper to operate if the symptoms do not improve in a few days, as they may be due to pressure that could be relieved by operation.

Stab wounds of the spine are not of importance unless the blade of the weapon happens to pass between two vertebræ, when it may divide the spinal cord, or, by injuring one of the vessels, cause hæmorrhage, which may either be fatal in itself or cause such secondary compression of the cord as to induce paralysis. In the latter case it is possible for the hæmorrhage to cease spontaneously, and, later, for the effused blood to be absorbed, and paralysis gradually diminish.

If a portion of the blade has been broken off and left imbedded in the tissues, it should be searched for and removed, provided it is giving rise to irritation, and can be removed with safety.

Sprain and Dislocation.

The vertebral column may be sprained as any other joint of the organism. If at all severe, it may be accompanied by a tearing off of small bundles of muscle.

In addition to the damage that may be done to the soft parts and bones, there is to be considered the injury that may at the same time be inflicted upon

the spinal contents: a much more serious matter. There may be laceration of the vessels, producing hæmorrhage, which may compress the cord sufficiently to cause paraplegia, or hæmorrhages into the substance of the cord itself, or there may be laceration of the cord. There may be also so-called concussion.

Symptoms.—These will depend upon the amount of damage that has been inflicted. There may be an external hæmatoma, which may not show itself for several days. If there has been a spinal hæmorrhage it may either be in connection with the membranes either extradural or subdural (hæmatorrhachis) or in the substance of the cord itself (hæmatomyelia).

If the hæmorrhage is extradural it is less apt to compress the cord sufficiently to cause paraplegia. The hæmorrhage in either variety may be extensive enough to pass from one end of the cord to the other.

If the paraplegia does not come on for some hours after the injury and if the line of anæsthesia mounts higher quite rapidly it is quite probable that hæmorrhage is the cause. Browning has suggested the use of an aspirator-needle to clear up the diagnosis.

If the hæmorrhage is in the cord itself, it may be either what is called a "destroying" or a "compressing" lesion. If the former, there will, of course, be permanent paralysis corresponding to the destruction of tissue. If a "compressing" lesion exists, there will be paralysis and anæsthesia, more or less complete, below the level of the injury, with retention of urine and fæces, and probably priapism, which subside as the blood is absorbed.

If a diagnosis of hæmatorrhachis can be made out and no improvement occurs after a sufficient length of time has been

given for the blood-clot to be absorbed, it would be good surgery to open the skin for the purpose of removing the compressing clot. Iodide of potassium internally is supposed to be useful in effecting absorption of clot.

Under the head of sprains may be classed a number of injuries of the spine which are accompanied by various disorders of the nervous system. These symptoms so frequently follow railway injuries that the term "railway spine" has been used in describing them, and some have concluded that the prompt recovery that at times follows the awarding of damages by a jury is proof that the patient was feigning disease; but the same symptoms in many instances are found when no one is held responsible for the injury and the question of damage does not come into consideration.

In some of the cases in which death has followed the shock, an autopsy has failed to reveal any gross lesions of the brain or cord. In other cases hæmorrhage is the cause of many of the symptoms, and in others there is a traumatic neuritis.

Some of these cases are incapable of any muscular exertion (unless the back is supported, and even have little control of the bladder), but when suspended and fitted with a snug plaster-of-Paris corset can do a fair amount of work. Many of these cases require the use of supports for the spine for years, though they are eventually able to dispense with it.

Dislocation of a vertebra is rare, but of moderately frequent occurrence, though usually it is accompanied by fracture, more or less extensive. It is most often met with in the cervical region; next, in the lumbar; and very seldom in the dorsal.

The diagnosis is to be based upon the sudden occurrence of disability following

traumatism, with some departure from the ordinary shape of the spine. Efforts at clearing up the diagnosis must be very guarded, as it is quite possible by careless manipulation to injure the already compressed cord so severely that permanent paralysis will ensue. If an x-ray apparatus can be secured, its aid should be invoked in making an exact diagnosis, which is perfectly easy in the cervical, and fairly so in the lumbar, regions, while sciagraphs of the thorax are unsatisfactory, except in children or very thin adults. It must also be noted that large experience in the interpretation of normal sciagraphs is necessary, to enable one to comprehend properly one of a pathological condition.

Treatment.—Efforts should be made by manipulation to replace the dislocated vertebra, and experience alone can guide the surgeon as to just how these manipulations should be made. In case pressure upon the cord is urgent enough to demand it, the vertebra should be exposed, by incision, if necessary, to effect reduction, such points of bone as interfere with the latter proceeding being removed for this purpose by the rongeur. If operative interference becomes necessary, it should not be delayed, as, the longer the spinal cord is subject to compression, the less likelihood there will be of repairing such injuries as it may have sustained, and, if it has been absolutely destroyed by the traumatism, the fact will then become known, and the patient and his friends know definitely what result to expect. If the case is one where no damage has been done to the cord, if the patient be free from pain, and the deformity slight, it will be unwise to endeavor to replace the vertebra, as not infrequently they become ankylosed in their new position, with comfort to the patient and safety to life, while efforts to restore them to

their original situation may result disastrously.

Sprains.—Sprains in this location, being similar to those occurring in any other joint in the body, require the same kind of treatment, namely: absolute and complete rest immediately applied. If the sprain be at all severe, and be accompanied by a tearing off of small bundles of muscle, the time of confinement must necessarily be longer.

The plaster-of-Paris jacket is the most easily applied and effective apparatus, in cases of sprained back. But anything which will immobilize the parts, and allow the trunk to move as a solid mass, will answer the purpose.

Bed-sores.—After injuries of the spine among the most distressing results that follow damage of the cord are bed-sores. These differ from the ordinary bed-sores which are caused by pressure of bony prominences, such as the scapulæ, sacrum, coccyx, trochanters, and heels, against the bed, and which are made worse by irritation of the skin by contact with urine and feces in the bed, etc., and are caused by paralysis of the nerves. They sometimes form inside of twenty-four hours, and usually first make their appearance as erythematous patches, which then turn into blebs, which burn, leaving a raw sore, which sloughs very deeply, perhaps down to the bone. If one side only of the cord has been injured the bed-sores will form on the opposite side.

TREATMENT.—This consists in the removal of all pressure, keeping the skin absolutely clean, washing the surface with alcohol and alum several times a day, and, after being thoroughly dried, dusting it with lycopodium, talcum, or boric-acid powder.

Another constant accompaniment of cord-lesions is retention of urine from

paralysis of the bladder. This is accompanied by incontinence of urine, and the patient lies in a pool of decomposing urine unless constant care is exercised to keep him dry.

On account of the paralysis of the bladder, part of the urine is retained, and becomes decomposed and some sets up disturbances in the kidney. If great care is not exercised to keep all catheters scrupulously clean, this is sure to follow as the result of infecting the urine.

Sacro-iliac Disease.

The recognition of this disease is based chiefly upon the position of the patient, who bends to the opposite side in order to relieve the affected sacro-iliac joint, as far as possible, from the pressure of the body, the weight being borne almost entirely on the opposite leg. Difficulty in bending or twisting the body is frequently experienced, and pain extends down the thigh, in the course of the great sciatic nerve. Careful local examinations will show tenderness on pressure, over the sacro-iliac joint, and if the two ilia are pressed together, so as to crowd them against the sacrum, pain will be produced. The same pain may be produced by crowding the head of the femur into the acetabulum, as pressure will thus be transferred to the hip-joint, but hip-joint disease can be excluded by the production of pain when the iliac crests are crowded together, and the hip-joint thus left out of consideration.

The temperature is apt to be but slightly elevated above normal: perhaps half a degree. The disease is likely to be mistaken for lumbago and sciatica, but the position as described above is typical in the writer's experience of this affection.

Treatment.—If the pain is extremely acute, the patient may be put to bed, with traction applied in the long axis of

the thigh, and also at right angles to it, in order to relieve pressure on the sacro-iliac joint, as far as possible. If the pain does not rapidly subside, the actual cautery should be applied, burning very deeply along the line of the joint. Mere superficial scarification is ineffectual. The weight of the patient should be borne on the sound leg, and an elevation of from four to six inches, according to the size of the patient, should be applied to this shoe, in order that the foot of the affected side may swing clear of the ground. The shoe of the affected side may have half a pound of lead, or more, according to the comfort of the patient, fastened to the sole, to produce traction on this joint.

If suppuration takes place, it will be necessary to thoroughly remove all tubercular foci, being careful that no pockets remain inside of the pelvis to cause infection. The older writers assumed that suppuration in sacro-iliac disease was necessarily fatal, but modern results show that this is by no means so.

At times, it is extremely difficult to differentiate between sacro-iliac and sacro-lumbar tuberculosis. In the latter, the plaster-of-Paris jacket gives prompt relief, and it is possible that it may be of use in sacro-iliac disease, although the writer has never personally made use of it.

Disorders of the Coccyx.—The coccyx rarely suffers from disease, except as the result of a traumatism, when it may undergo necrosis, and require removal.

COCCYGODYNIA, so called, at times demands the removal of the coccyx, which is performed by enucleating it through a longitudinal incision, made directly over it. But the great majority of cases that suffer from pain in the coccyx do so because of some other disturbance,—either a misplaced uterus or exhausted

nervous system,—and such cases must be very carefully excluded before the diagnosis of coccygodynia is made, otherwise, although the bone be removed, the pain will continue.

Laminectomy.—Access to the spinal canal for the purpose of relieving pressure on the cord caused by fracture, abscess, inflammatory exudates, or tumors or for any other purpose is almost always obtained by removal of the laminae of the vertebrae. The entire back should be prepared for operation with great care. If possible, the operating-table should be provided with a hot-water plate or other means of keeping the patient warm to lessen the shock, which is often severe, and means should be at hand for subcutaneous injection of salt solution in addition to the ordinary stimulants. A large number of hæmodynamic forceps will be required, as very many bleeding-points must be seized at once.

In many cases the difficulty which has given rise to the necessity for operation has interfered more or less with the function of respiration, and, as the patient is of necessity placed in the prone or semi-prone position, the anaesthetist must pay more than usual attention to the condition of the patient.

Many surgeons advise making a single straight incision in the median line, which should be long enough to include five or six vertebrae. The muscles are then retracted to such an extent as to uncover the laminae on one side. A short cutting knife should be used to free the muscles from the bone, for, if a dull instrument is used, the tissue is apt to be so badly lacerated that necrosis follows.

Hæmorrhage is apt to be very profuse at this stage of the operation, but time will be wasted if the surgeon attempts to catch vessels. He should, instead, pro-

ceed rapidly to complete the incision and stop the bleeding by pressure of compresses wrung out in water as hot as can be borne by the hand. The wound should be tightly packed while the laminae on the other side of the spine are being exposed. The second wound is then packed and the bleeding checked in the first. Peroxide of hydrogen at this stage is of use as an hæmodynamic. The interspinous are cut through. In the dorsal region the incision must be made in a slanting direction, owing to the overlapping of the upper over the lower vertebrae. With a rongeur or some of the various kinds of rib-cutters the laminae are then cut through and removed.

Instead of this plan a number of surgeons of experience prefer making an osteoplastic resection, using an H or U incision. Some of them use Hey's saw or a chisel to divide the laminae. Care must be had to make the cut through the laminae at a sharp angle, otherwise it will not enter the spinal canal. The interspinous ligament of the vertebrae at the cross-cut is now divided, and the flap with the spinous processes and arches attached is now reflected upward and to one side, otherwise the spinous processes will strike each other and prevent lifting the flap.

When the arches have been removed, a layer of adipose tissue is met with: this should be divided in the median line and pushed aside, when the dura will be brought into view. Bleeding, which occurs during this process, can be controlled by pressure, hot water, and peroxide of hydrogen. The cord should pulsate. If it does not, the absence of pulsation may point to adhesions, swelling of the cord, or pressure by bone or fluid. If relief from bone-pressure is being sought, it often is not enough to remove the laminae, as the pressure may be caused

by encroachment on the anterior surface of the spinal canal. To reach this the spinal cord may be drawn to one side by an aneurism needle or other blunt hook, and this proceeding will be much facilitated if the two extremities of the patient's trunk are supported on sand-bags, making the spine concave posteriorly, so as to relax tension on the cord. Should it be necessary to divide any nerve-roots in order to move the cord far enough to one side to reach the bodies of the vertebrae, these nerves should be sutured before the close of the operation.

If the dura is distended with blood, its color will be purplish; yellow, if pus be present. The presence of a tumor can usually be determined by touch.

If the cause for which the spinal canal was opened has not been satisfactorily removed, the dura should now be opened. If a tumor be present, it should be removed if possible, but it may infiltrate the cord so as to be inoperable. Blood-clots, fragments of bone, etc., should, of course, be removed when the cord is lacerated. Efforts to suture it have so far been unsuccessful. The dura should then be closed with fine sutures unless for some reason pressure on the cord is not desired. The skin incision may or may not be drained, the dependent position of the cut favoring the escape of fluid. If a drainage-tube is employed, it should be removed in twenty-four hours. A plaster-of-Paris bandage outside all the dressings is advisable in almost all cases—certainly in those for Pott's disease and in fracture.

Literature of '97-'98-'99.

Seventeen laminectomy operations performed. Of 7 acute traumatic cases, 3 of which were in the cervical region, no shock followed operation, and even in 10 rapidly-fatal cases a temporary improvement followed intervention. Those injured in the upper part of the cord

died, with sudden and marked elevation of temperature. Two dorsal cases lived for several months, neither injured nor benefited by the operation. Autopsy in three cases showed complete crush and softening of the cord. Of 4 chronic traumatic cases, 1, a fracture dislocation of the second cervical, was markedly improved in the paralysis of the upper extremity and in the motions of the head; a second, operated upon during a secondary acute affection of the cord, was not benefited by interference, but died in a few hours with high temperature. A third middorsal case, and almost hopeless from the start, was relieved of the athetosis, but gradually succumbed to sepsis. A fourth, upper lumbar, though paraplegic and typhoidal at time of operation, made a complete recovery, so that she could earn her living at general housework at the end of eight months. Of 2 adults with paralysis from caries, 1, upper cervical, was perhaps slightly benefited; the other, one of 10 earlier cases, died of acute peritonitis, probably from being placed in the prone position after operation,—a position that has proved not only useless, but at times dangerous. Of 2 cases of syringomyelia, both were markedly benefited by operation, and though ultimately the disease is fatal, yet the relief justifies the simple operation of opening the spine and dura. Two cases of sarcoma were operated upon,—one a diffuse growth, the other melanotic; but very little, if any, benefit resulted. In operating, a single median incision is recommended: hæmostasis by gauze packing; removal of the laminae by special forceps, without chisel or trephine; the dorsal position after an operation that should not last over half an hour. J. C. Warren (Boston Med. and Surg. Jour., May 18, '99).

R. H. SAYRE,

New York.

SPLEEN, DISEASES OF.—The spleen shows little tendency to primary disease, but is easily affected secondarily in infectious states of the blood and in diseases of the blood-forming organs.

Literature of '97-'98-'99.

Excluding enlargements of the spleen due to malaria, syphilis, leukæmia, rachitis, etc., the primary enlargements of the spleen are divided into two classes: 1. Those that give rise to no symptoms except of a mechanical nature. These are more common than is generally supposed. 2. Those that are associated with anæmia, for which the term splenic anæmia is to be preferred. The special features of these are their chronic course: the bronzed skin, the chlorotic type of blood, and the hæmorrhages. William Osler (*Phila. Med. Jour.*, Dec. 17, '98).

The splenic substance consists essentially of an aggregation of lymphoid tissue with a very rich vascular supply. Its function is uncertain, but that it is not essential to life or development is shown by the effects of its removal in lower animals as well as in man. If it has become materially altered by chronic disease its removal is not followed by any definite disturbances other than those incident to the operation, as compensation has often previously been established.

One hundred and eighty-seven cases of splenectomy collected, 46 operations being for injury and 143 for disease; 31 in men, 112 in women. The cases classified as follows: 1. Cases of leukæmia, 36, with 5 recoveries; 16 deaths from secondary hæmorrhage and 9 from shock. 2. Malarial cases, 40, with 24 recoveries (a personal case among them). 3. Cases of "simple hypertrophy," 59, with 34 recoveries; 9 deaths from hæmorrhage. 4. Cases of neoplasm, 5 (sarcomata), with 2 recoveries; other cases were 8, with 5 recoveries, 6 being cases of cyst. In cases where analysis of the blood was made before and after operation, in two increase of red cells was found, and in two diminution. Richard Douglas (*Jour. Amer. Med. Assoc.*, Apr. 25, '96).

After the removal of a healthy spleen, however, there are marked constitutional disturbances. The following symptoms

have been noted: Extreme anæmia, emaciation, daily rise of temperature and increased frequency of pulse, attacks of fainting, headache, drowsiness, great thirst, severe griping pains in the abdomen and pains in the arms and legs; marked enlargement of the lymphatic glands, which may be permanent and compensate for the loss of the spleen; great diminution of the red blood-corpuscles, and considerable increase of the leucocytes.

Literature of '97-'98-'99.

The spleen personally extirpated in some 200 guinea-pigs, and subsequently virulent diphtheria bacilli or the toxins obtained from them have been injected. With the toxins there was no distinct difference between the animals with or without their spleens. In the case of the bacilli, animals deprived of their spleen lived longer than the others. With the injection of virulent anthrax the animals died in about the same time, whether the spleen had been previously extirpated or not; only one animal, and that without its spleen, survived. Different results were obtained with a virulent pyocyaneus toxin and an active cholera culture. In the case of the bacteria the animals without their spleen lived much longer than the others. Thus, both with diphtheria, cholera, and pyocyaneus bacilli the animals deprived of their spleen showed increased resistance, and especially with the two last-named bacilli.

A considerable leucocytosis followed upon the splenectomy. Thus it is concluded that the splenectomy produced the hyperleucocytosis, and this latter led to an increased bactericidal action of the blood and to an increased resistance against infection. Blumreich and Jacoby (*Berl. klin. Woch.*, May 24, '97).

After splenectomy the red blood-cells and hæmoglobin are greatly diminished, and the leucocytes increased, and shortly after operation (ten to twenty-three days) the red blood-cells and leucocytes are again normal in ratio. There is, however, a deficiency in the amount of

hæmoglobin which persists, in slight degree, for some months. Frank Hartley (Med. News, Apr. 2, '98).

The symptoms gradually abate; convalescence is slow, but recovery becomes complete. In children these symptoms are much less marked and may be absent, probably on account of the great abundance of lymphatic tissue and of red bone-marrow in early life. In some cases the existence of accessory spleens doubtless accounts for the absence of symptoms after removal.

Hyperæmia of the Spleen.—Acute hyperæmia of the spleen occurs fairly constantly in acute infectious diseases, such as typhoid fever, septicæmia, and ulcerative endocarditis. It is also met with, but less frequently and in less marked degree, in toxæmia. In all infectious diseases there is great tendency to the accumulation of bacteria in the spleen. The free blood-supply sweeps them into the spleen and on account of the slower current through its dilated vessels they are left behind in its substance where they may be found, in many instances, weeks after they have disappeared from other organs.

The presence of bacteria in the spleen causes hyperæmia and swelling of the organ, especially marked in early life, when the lymphoid tissue is most abundant and the capsule most distensible. The swollen spleen is usually soft, may be even diffuent; but it may be firm, especially in more chronic cases, or in repeated attacks. The substance is usually dark, but it may present a grayish color from the great number of leucocytes present. The Malpighian bodies are generally affected, being swollen on account of great proliferation of their cellular elements, which may show necrotic changes caused by the toxins.

The pulp also shows much prolifera-

tion of its cellular constituents, and may present areas of necrosis, and many small hæmorrhages. Similar changes may be caused by toxæmia without the presence of bacteria in the spleen, but they are less marked, as the poison is much less concentrated than it is when produced in the spleen by active bacteria present.

Malformations.—The shape of the spleen may deviate greatly from the normal. It may be rounded or elongated. Its anterior margin may present several notches, or a single deep one almost dividing the spleen into two parts. The notch may be near the lower end or even on the posterior border. Long processes may be given off from the main body; such a process has been met with extending down into the serotina, doubtless carried there in the descent of the testicle. Accessory spleens—splenuli or lienculi—are quite often met with, usually in peritoneal folds near the hilum. Occasionally the spleen is represented by a number of small masses scattered about the peritoneum or clustered into masses like bunches of grapes. They may become imbedded in the spleen itself. They are supposed to be more common in early life. Congenital absence of the spleen is very rare in otherwise normal bodies.

Atrophy.—In children the spleen is large; after middle life it undergoes atrophy, as is the case with other lymphatic structures, such as the tonsils, Peyer's patches, thymus gland, etc. In old age atrophy may be of extreme degree, only a remnant being left. The capsule is shriveled and thrown into folds; it is somewhat opaque and thickened. From atrophy of the pulp the vessels and trabeculæ stand out prominently. In some cases there is great increase of the interstitial connective tissue as in cirrhosis of the liver or kidney,

and the organ may not be reduced in bulk.

Hypertrophy.—**SYMPTOMS.**—There is usually marked anæmia and often internal hæmorrhages, especially intestinal; but these symptoms are probably due to the associated conditions rather than to the spleen itself, and to these the treatment should be directed.

Literature of '97-'98-'99.

Cases of so-called primary enlargement of the spleen are divided into: (1) those in which the spleen is enlarged without causing any symptoms other than those due to mechanical pressure: (2) cases of enlargement accompanying anæmia. The former condition is more common than is ordinarily suspected. Usually in this class the spleen is only moderately large. In the past few years there have been personally seen 4 patients, all women, apparently in perfect health, complaining only of a feeling of pressure in the abdomen, in all of whom the spleen was much enlarged. The term anæmia splenica, which describes the second class, should be restricted to those cases in which progressive anæmia develops in connection with primitive splenomegaly. The relation of the enlarged spleen to the anæmia is still in doubt. Four cases of this class have come to personal notice during the present year. The peculiarities manifested in these cases were the remarkably chronic course, extending from 3 to 12 years, the chlorotic features of the blood, the hæmoglobin value often not more than 50 per cent.; the peculiar bronzing of the skin; and, lastly, hæmorrhages, which may be toxic, as in leukæmia, and widespread or mechanical, resulting directly from the condition of the enlarged spleen. Particular attention is called to the condition of bleeding, in which for many years hæmorrhages occur from the stomach and bowels; the bleedings are profuse, and in the above cases they occurred during a period of from nine to twelve years, while in the intervals the patients have regained their flesh and strength and have been able to carry on their oc-

cupations. The special feature of hæmorrhages in these cases are considered entirely due to mechanical causes. In no case have there been associated cutaneous or retinal hæmorrhages.

In diagnosing conditions associated with enlargement of the spleen it is necessary to recognize a primitive splenomegaly with a practically normal blood-count. Cases of chronic enlargement of the spleen extending over many years present, as a rule, anæmia of a chlorotic type, with low corpuscular and low leucocyte count. The more pronounced does the corpuscular anæmia become, the more striking are the changes in the red corpuscles, and in advanced cases the blood may be like that of a pernicious anæmia. The most confusing and puzzling condition, however, is that in which, with enlargement of the spleen, the condition of leukæmia may be present during one month, and in the following that of a simple splenic anæmia. The question of diagnosis from Banti's disease, primitive splenomegaly, with an associated terminal cirrhosis of the liver and jaundice, must be considered. Osler (Edinburgh Med. Jour., May, '99).

ETIOLOGY.—Great enlargement of the spleen is met with in chronic malaria, splenic anæmia, leukæmia, and occasionally in cases in which no apparent cause existed. In rickets it is also said to be enlarged; but probably this is rather apparent than real, and due to displacements of the spleen downward by deformity of the chest. The enlargement may be due to general and fairly equable increase of the various constituents of the organ, but in chronic cases the connective tissue is usually in excess. The increase in size may be so great as to extend to the pubes below and well across into the right side of the abdomen, and it may weigh fifteen or twenty pounds.

That the enlargement is not due to congestion alone is proved by the fact that it is never materially enlarged in diseases of the liver, heart, or lungs, in

all of which venous obstruction is a prominent symptom. Some toxin or irritant seems necessary to produce the changes present.

TREATMENT.—In malaria, quinine is indicated and in splenic anæmia arsenic is the only remedy that seems of service. In a typical case under my care a few years ago the use of arsenic succeeded satisfactorily, while general treatment with iron, etc., was of no benefit.

Literature of '97-'98-'99.

Left half of the abdomen sprayed with ether in twelve cases of enlarged spleen. From $6\frac{1}{2}$ to $7\frac{1}{2}$ drachms of ether were sprayed over the splenic area, once daily, through a Richardson atomizer. Marked reductions in volume of the spleens were observed in all twelve cases. No bad results. As a rule, the affected area only was played upon, the remainder of the abdomen was covered with cotton-wool. Moscucci (Riforma med., Apr. 23, '98).

The operation of splenectomy is indicated in a malarial spleen in the absence of leukæmia, of extensive adhesions of the organ, and of well-marked cachexia, whenever medical treatment has failed. The indications for surgical treatment need not be influenced in any way by the size of the spleen. Jonnesco (Progress Méd., No. 12, '97).

A comparison of the operations on the spleen may be thus stated:—

(a) Removal of the whole spleen necessitates the ligaturing of: 1. The splenic branches or, what is the same thing in effect, the splenic artery and nerves before they divide into their terminal branches. 2. The vasa brevia arising from the terminal or splenic branches. 3. The branches from the left gastro-epiploic and phrenic when present.

(b) Removal of the upper half necessitates the ligaturing of the same arteries except the lower two or three terminal branches, as many as from twelve to eighteen vessels and nerves being included in the ligatures on the pedicle.

(c) Removal of the lower half can be effected by ligaturing the lower two or three terminal branches only. In the

two latter operations there is, in addition, the continuous ligature across the spleen.

From this it will be seen that excision of either the whole or the upper half of the spleen involves great damage to the splenic plexus with its intimate (three-fold) connection with the solar plexus and right vagus; entails direct interference with part of the nerve-supply of the stomach and omentum, and severe indirect interference with the vagi and all the sympathetic nerve-supply of the abdomen; the diaphragmatic plexus is often involved and considerable tension has to be applied to the pedicle, and therefore on the celiac and solar plexus and the vagi, thus augmenting the interference with these nerves. The excision of the lower half entails but slight damage to the splenic plexus, and therefore but slight indirect interference with the solar plexus and vagi; the nerve-supply to the stomach, the omentum, and the diaphragmatic plexus is never involved and but slight tension has to be applied to the pedicle. As shock is due to severe inhibition and exhaustion of nerve-function, and, the grosser the lesion, the greater is the shock that results, this great difference in the amount of interference with the nervous system in these operations is the explanation of the great difference in the amount of shock following them: and in the excision of the whole spleen or of the upper half the resultant shock is due to inhibition and exhaustion of the vasoconstrictor fibres of the abdominal sympathetic, and is probably intensified by great interference with the proper performance of the functions of the heart, lungs, stomach, etc., reflexly by means of the vagi. These considerations should induce one to advise in suitable cases in the human being—*c.g.*, abscess, tumor, or cystic disease confined to the lower half, or in hypertrophy which resists medicinal treatment—the excision of the lower half in preference to that of the whole spleen, as the same object would be attained (the removal of the disease or the enlargement), while a considerable portion of the spleen would be left to carry

on its function: and, further, there would be, as a reasonable inference, a considerable reduction in the death-rate. H. M. Jordan (*Lancet*, Jan. 22, '98).

Infarcts.—Embolism of the splenic artery most frequently arises from particles of blood-clot or vegetations dislodged from the left side of the heart. If the emboli originate from ulcerative endocarditis they will contain pyogenic bacteria and suppurating infarcts will result. Such emboli occur also in pyæmia, originating in suppurative foci in various parts of the body and give rise to multiple abscesses of the spleen.

Simple non-infective emboli usually arise from benign endocardial lesions or from blood-clot, and cause simple infarction. Thrombosis of a branch of the splenic artery in acute fevers and in leucæmia may occur and infarction result.

A simple splenic infarct is usually at first pale, but, after some hours or days, the veins of the ischæmic area become filled with blood, which easily passes through their walls, as they have been rendered more permeable by the long-continued anæmia.

The infarct forms an irregularly triangular mass with its base projecting slightly above the surface of the spleen. Decoloration soon takes place, and the infarct is gradually converted into a cicatrix.

If the embolus contains pyogenic micro-organisms the early stages do not differ from those of non-infectious emboli; later the infarct becomes converted into an abscess.

Abscess.—Occasionally a large single abscess is found in the spleen with signs and symptoms indistinguishable from subdiaphragmatic abscess, an abscess of some other abdominal organ, or of the abdominal wall itself.

Infective emboli from malignant en-

docarditis are among the most frequent causes of splenic abscess. "Hence a tender swollen spleen with pyrexia and a cardiac murmur is a certain sign of ulcerative endocarditis" (Fagge). In such cases softening and suppuration soon follow the occurrence of infarction. In general pyæmia embolic abscesses are similarly produced and often met with. The emboli may come from suppurating foci in any part of the body. The abscesses are usually small and multiple.

Extension of inflammation from a neighboring organ usually only causes local perisplenitis, but perforating ulcer of the stomach or intestine that becomes adherent to the spleen may cause abscess in it.

Injury of the spleen may lead to supuration by lessening its resistance to pyogenic bacteria that gain access to it through the blood.

Abscesses are occasionally met with in typhoid fever, malaria, suppurative pyelophlebitis, etc.

The treatment is the same as that of any other abscess in this situation.

Tuberculosis.—In general tuberculosis the spleen is always much affected. The tubercles are more evident on the capsule than in the substance, where they are with difficulty distinguished from the Malpighian bodies. The spleen is large and soft. In chronic tuberculosis large caseous masses are not common, but occur in children oftener than in adults. Miliary tubercles are usually found about the masses. Before caseation takes place the masses resemble lymphadenomatous deposits, and can only be differentiated by the microscope.

Lardaceous Disease.—Waxy deposit takes place probably more frequently in the spleen than in any other organ, and it may be alone affected. The deposit may exist in the Malpighian bodies or

the substance of the spleen. In the former and more common form the capillary walls in the Malpighian bodies are affected. The Malpighian bodies are much enlarged and gray in color, resembling sago-grains; hence the name "*sago*" spleen. The organ is somewhat enlarged and anæmic.

In the latter and rarer form the arteries of the splenic substance are affected, the Malpighian bodies usually escaping and later becoming atrophied. Lardaceous deposit takes place in the pulp later, and the spleen may become much enlarged and converted into a large, resistant, pale mass with rounded edges.

Tumors of the Spleen.—Primary carcinoma of the spleen is of doubtful occurrence, and even secondary infection is rare. The peritoneal coat and the connective tissue of the hilum may become involved by extension of disease from the stomach, peritoneum, or retro-peritoneal glands. The growth may then invade the gland directly or extend along the vessels from the hilum. Primary sarcoma may occur, and a few cases have been described. Secondary growths are not very rare.

Cysts of any kind in the spleen are rare. Simple serous cysts are occasionally met with. Small ones on the surface may result from a dilated lymphatic vessel. Traumatism may be followed by a cyst containing blood or *débris* from previous hæmorrhage. Hydatid cysts occur occasionally in the spleen, which alone may be affected, or in association with other organs, especially the liver. In half the cases there are no symptoms. Innocent tumors of the spleen other than cysts scarcely ever occur.

Wandering Spleen.—Many errors in diagnosis have occurred from wandering spleen. The organ may be found in any

part of the abdomen, and it is often extremely mobile, especially in women who have borne children. It may cause great discomfort, rolling about like a foreign body. If twisting of the pedicle occurs it may be followed by gangrene or atrophy of the organ. It may become adherent to any organ and drag it out of its place.

The diagnosis may be difficult, the mass being liable to be mistaken for tumors of the ovary, kidney, pancreas, etc. Its shape, the notch on its anterior border, and the evidence of its absence from its normal situation may make a diagnosis possible.

TREATMENT.—In some cases it can be retained in position by a well-fitting abdominal bandage. If this fails it can be exposed and sutured in place. When this fails and it is giving discomfort it should be removed.

Literature of '97-'98-'99.

Splenectomy for wandering spleen is not only justifiable, but is a highly successful operation, the rate of recovery being equal to that of ovariectomy in skilled hands. A score of cases performed within the last twenty years without a death have been collected. Bland Sutton (*Lancet*, Jan. 16, '97).

Perisplenitis.—This may be local or general.

Local perisplenitis may result from many causes, among the most frequent being the extension of inflammation from diaphragmatic pleurisy and from the pleurisy occurring in pneumonia of the base of the left lung. It may also be secondary to inflammation of some other abdominal organ. In other cases it originates from some cause within the spleen, as infarcts, tubercle, and lymphadenoma.

General perisplenitis usually arises from chronic peritonitis which may affect the

whole peritoneum. It resembles closely the condition in perihepatitis. The spleen is covered by a dense membrane of irregular thickness. Its outer surface is fairly smooth, but shows many pit-like circular depressions similar to those seen on the liver. They are probably due chiefly to disturbance of the exudate during the plastic stage by respiratory and other movements of the spleen and partly to ruptures caused by cicatricial contraction that took place during the organization of the exudate. Adhesions may be absent in these cases.

ALEXANDER MCPHEDRAN,

Toronto.

SPRAINS.—A joint is said to be sprained when it is twisted violently so that its ligaments are either over-stretched or partially torn, with or without displacement of the osseous surfaces. Sprains of the wrists and ankle-joints are most common.

Symptoms.—The first symptom of sprain is a very severe, often sickening pain, which is rapidly followed by swelling (most noticed in those parts where there is least pressure from ligaments and tendons) and inflammation of the joints and its investing tissues, which is often chronic and tedious. As the inflammatory symptoms subside, the joint becomes stiff, and, when moved, pain appears and persists for some time. In some cases rigidity and wasting of the limb follow the disappearance of the inflammatory symptoms. If the ankle or the knee is sprained; the patient cannot walk at all or at best only with a limping gait.

Diagnosis.—The diagnosis of sprain is usually easy. If in a hinge-joint a lateral ligament has been entirely torn across, the gap may usually be felt, and an increased mobility of the joint will

be present. Touch will detect a laceration of a muscle or a fracture with or without separation of the fragments as through the malleolus or in the lower end of the radius. "Sprain-fracture" (fracture of a portion of the articular surface), as pointed out by Callendar, may occur in the ankle, and may not be detected by touch, thus explaining many cases of ankylosis of the ankle following an apparently simple sprain.

Etiology.—Sprains are usually produced by a sudden wrench or twist of the joint, and occur in the ankle as the result of a misstep or fall upon the foot, and in the wrist as a result of a fall upon the hand. They occur more commonly in young and middle-aged adults, in joints that have previously suffered similar injury, in deformed limbs, and in subjects having underdeveloped muscles and relaxed ligaments, as in weak-ankled persons.

Pathology.—A sprain may be so slight that its effect quickly subsides, or it may be associated with dislocation or fracture or both. The line of displacement usually passes through that part in which there is normally the least motion; so that in the hinge-joints it is lateral. Through this unnatural movement the synovial membrane is unfolded upon one side and compressed on the other and is usually crushed and torn. The ligaments are at first slightly stretched, but, being quite inelastic, may give way, if sufficient force be exerted upon them, resulting in various degrees of injury, from the rupture of a few fibres to that of the entire ligament, to its detachment from the bone, a fracture or dislocation, or a rupture of distant muscles. The blood-vessels about the joint are lacerated, and more or less extensive hæmorrhage into the joint-cavity, into the interstices of the articular structures, and

into the surrounding connective tissue occurs. When the hæmorrhage into the joint-cavity is large, it indicates severe injury and increases the gravity of the case; the fullness resulting from such extravasation may appear within a very short time, but usually after a few hours, being then formed partly by the extravasation, but principally by effusion into the joint-cavity and the structures about the joint. After several days discoloration of the skin is noticed, which is caused by subcutaneous capillary extravasation. When the hæmorrhage into the joint-cavity has been large, blood-clots often persist for some time, and, by becoming organized and adherent to the synovial membrane, result in the formation of adhesions which limit the movements of the joint, if they do not, indeed, cause ankylosis.

Prognosis.—The prognosis varies with the joint involved, the extent of the injury, the habit of the patient, the promptness of attention, and the efficiency of the treatment. When hæmorrhage into the joint-cavity has been large, there is more interference with the action of the joint. In persons of gouty or rheumatic habit the inflammation of the joint is generally tedious and chronic in character, and will only yield to suitable constitutional treatment (colchicum, iodides, etc.). In strumous subjects destructive disease of the joint often follows this injury.

Treatment.—Slight sprains need little attention; a stimulating liniment well rubbed in and the application of a bandage to give support are all that need be done. In sprains at all severe more active treatment is necessary, the nature of which will depend upon the condition of the joint when first seen. Two indications must be met: perfect rest must be assured and inflammatory action pre-

vented or subdued. If the case is seen immediately after the accident, and before any great swelling is present, the joint may be strapped very firmly with long strips of plaster, over which an immovable dressing (starch, silicate-of-soda, or plaster-of-Paris bandage) may be applied, by which rest, immobility, and compression of the joint are secured. The application of an immovable dressing will allow the patient to go about and attend to business, crutches being used if the knee or ankle is involved, or the arm being placed in a sling if the joints of the upper extremity are affected. If preferred, the joints may be wrapped with cotton, and a plaster-of-Paris bandage applied over it. In either case, if much blood has been effused into the joint, it should be removed by aspiration, the needle being first made aseptic.

Should inflammation with much swelling be present, this may be subdued by the usual means (cold water, evaporating lotions, leeches, etc.); when the swelling has somewhat subsided, the care of the joint should follow the course already outlined to secure the necessary rest: immobilization and the compression of the joint. Later, when pain and stiffness alone are left, douches of cold water used twice daily, followed by massage with soap liniment, will usually restore strength and mobility to the joint.

Literature of '97-'98-'99.

A plan of treatment that seems to be well suited to sprains of all degrees of severity, and which can be used with or without fixed dressings and bandages, according to the indications, is massage properly applied. Massage should not be begun immediately over a recently-injured joint; neither should passive nor active motion be encouraged in spite of pain caused thereby.

A snug bandage is usually sufficient to

afford rest and support, and to press the swelling out in the intervals between the massages. But if the bandage does not give sufficient support, then an easily removable splint or plaster may be applied. Joints tender and swollen, that do not admit of massage being applied directly upon them, can be approached by commencing on the healthy tissues some distance above them and nearer to the trunk, by gentle stroking in the direction of the returning currents of lymph and blood, and gradually proceeding downward. The healthy tissues beyond the seat of the injury should also be similarly treated.

The returning currents are then pushed along more rapidly, making room for exudations to be carried off. For this purpose each hand should make alternate strokes, using the greatest possible extent of the palmar surface while the limb is in a comfortable position.

After working a few minutes in this manner, deep manipulation, or massage properly so called, may be brought into play, beginning, as before, above the painful joint by adapting the greatest possible extent of hand and fingers, one hand contracting and making the greatest push upward as the other relaxes while gradually approaching the objective point. The parts beyond the sprain should be treated likewise. By alternately stroking and kneading in this manner one can soon make gentle, firm pressure over the but recently painful and swollen joint. If sufficient tact be used this pressure may not hurt, and very soon it can have motion added to it. When a light touch is disagreeable, firm pressure often affords relief, so that the whole hand is better than the finger-tips.

In recent sprains and synovitis this method is rational. The good effects of the massage are continued by means of a bandage well applied. Rubber bandages are not advised except for temporary use, as when a patient with weak joints wants to go sea-bathing. A Domet (or cotton flannel) bandage may be used instead. Douglas Graham (Boston Med. and Surg. Jour., June 24, '97).

For several years massage has been personally employed on sprains.

The old practice of immobilization of sprains is now generally conceded to be improper, for more than a few days. Personal routine practice, even in those cases in which there is considerable laceration, is to first use the hot and cold alternating douche for ten minutes to allay pain, then to gently rub and knead about the injured joint for some fifteen minutes, and to apply a flannel bandage. Perfect rest for twenty-four hours is enjoined. On the second day more thorough kneading and stroking is done and a little passive motion is employed; and this is followed up daily.

In the case of a "sprained ankle" in which there is much extravasation of blood, tendo-synovitis, and escape of synovial fluid, the immobilizing treatment is most objectionable. By its use adhesions are apt to form, impairment of function with pain results, and where there is a tubercular taint proper conditions for a localized tuberculosis are established. The same is true of the wrist, knee, shoulder, and other joints.

The use of a skillfully-applied flannel bandage is a very important adjunct to properly-applied massage. The bandage should be broad, cut on the bias, and should cover with firm and evenly distributed elastic pressure all the parts as far as the adjacent joints on either side, with an extra pad over the injured joint itself.

After the first day the patient should go about on crutches, in the case of a sprained ankle; and, after the third day, he should be encouraged to begin bearing a little weight on the foot. Two to three weeks often suffice to put such a sprained joint in a condition for careful use. J. G. Mumford (Boston Med. and Surg. Jour., June 17, '97).

The treatment of sprains personally pursued is as follows: The mildest cases are satisfactorily treated by daily massage and bandaging. Immediate massage is never used in severe sprains.

Taking the ankle-joint as a type in acute sprains, the best results are obtained by the immediate application of wet mill-board strips applied over several layers of sheet wadding, and bandaged tightly, but evenly. This dressing is left

undisturbed, except for additional roller bandages applied outside, for two or three days. At the end of this time, if the swelling has disappeared for the most part, if the sprain was a severe one, a circular plaster-of-Paris bandage is applied from the toes to below the knee. This bandage is split and removed every two or three days to note the progress of the joint. With the subsidence of the acute symptoms massage is begun, and the plaster at once reapplied for twenty-four hours. The plaster is discontinued gradually, to be replaced by a flannel bandage. Douches of hot and cold water are used in connection with massage.

The immediate application of plaster of Paris is objectionable. Cotton bandages and hot water, however faithfully applied, are but poor makeshifts. A sprain is either slight enough to be treated by massage from the first, or severe enough to receive for a day or two, at least, the most complete and efficient fixation. R. W. Lovett (*Boston Med. and Surg. Jour.*, June 17, '97).

The Gibney treatment of sprained ankle is as follows: Ordinary adhesive plaster is cut into strips $\frac{1}{2}$ inch wide and in two lengths, about 12 and 18 inches long. As soon as the patient is seen, one of the longer strips is placed around the ankle, parallel to the sole of the foot, beginning in front of the big toe, carrying the strip around the ankle just above the contour of the sole, and bringing the end back across the top of the foot to about the point where the strip began. It is well to place, overlapping this initial strip, a parallel piece. These strips should be drawn as tightly as possible. Next another strip should be placed at right angles to them, which makes it run parallel to the back of the leg. One of the shorter strips should be selected for this purpose. Beginning well behind and above the ankle, this strip should be carried down around the sole of the foot and brought up on the other side of the leg, making, as it were, a stirrup for the foot. This strip is closely applied. Now the strips should be applied alternately, first one around the ankle parallel to the sole, then one parallel to the back of the leg, each one over-

lapping the one previously applied, running in the same direction, to some extent, until the entire foot is inclosed in a boot of adhesive plaster, having the appearance of a shoe in which part of the heel has been cut away. Over this dressing is now placed an ordinary roller bandage. The patient should be careful for a day or two, when he can begin to move around rather freely. This dressing should be kept on until the pain and swelling have subsided. If the dressing becomes loose, it can be reinforced by additional strips placed over the loose ones. J. H. Adams (*Railway-surg.*, Jan. 10, '99).

Attention is called to the use of static electricity in the treatment of sprains. Personal technique is as follows: A thick woolen shawl, folded many times, is carefully placed over the ankle and foot, and the static massage roller is used as strongly as the patient can bear it for fifteen minutes on the foot, ankle, and leg. The patient is seated on a stool on the floor, not on the insulated platform. The roller is attached by the chain to the positive pole of the static machine. These patients will recover, when electrical massage is thoroughly used, in half the time required by other forms of treatment. C. O. Files (*N. Y. Med. Jour.*; *Pacific Med. Jour.*, Aug., '99).

To apply the electrostatic treatment in the most satisfactory and convenient manner, and with the best results in sprains, the use of the Morton wave-current, as used in the New York Post-graduate Clinic at the present time, is recommended. The patient is seated upon the platform with the negative pole grounded, the balls of the prime conductors being in contact, the affected joint being incased in a sheet of bandage of block-tin, closely molded to the surface. With one cord the patient is connected with the positive pole of the machine. The machine is started and the spark-gap is gradually opened until either the muscles are thrown into slight contractions on the patient complains of discomfort from the treatment. At this point, the machine should be allowed to run for from ten to twenty minutes. W. Ben-

ham Snow (Jour. of Electrother., Oct., '99).

STATUS LYMPHATICUS AND DISORDERS OF THE LYMPHATIC SYSTEM.

General Considerations.—In addition to the closed channels which carry the blood in a continuous round through the arteries, capillaries, and veins, there is another complementary system of vessels, found in every tissue and organ of the body supplied with blood-vessels, whose currents flow in one direction only, from the periphery to the centre, and discharge into the great veins near the heart the fluids which have been absorbed in the solid tissues of the body (for plate, see ADENITIS, volume i). The fluid contained in these vessels is nearly or quite colorless, especially in thin layers, and from its appearance is called lymph; the vessels with the lymphatic glands constitute what is known as the lymphatic system. In their anatomical structure the vessels resemble the veins; injury and disease affect them in a similar manner. These vessels functionate as absorbents, and are the principal carriers of septic infection from the periphery to the central circulation. The serous flow from wounds, which necessitates the employment of drainage, comes from severed lymphatic vessels. The lymphatics are involved in all wounds. The numerous superficial lymphatic plexuses of the skin readily absorb antiseptic or poisonous solutions applied to the surfaces, and explains remedial action or poisoning, as the case may be. The amount of lymph in circulation is greater in youth than in advanced life, and the lymphatic glands are more highly developed and active; hence the greater frequency of disorders of the lymphatic glands in early youth. The lymphatic glands are scattered along

the course of the lymphatic vessels and form part of the lymphatic system.

Status Lymphaticus (Lymphatism; Constitutio Lymphatica).—This is a somewhat rare condition observed chiefly in children and young persons, in which the lymphatic glands and lymph-tissues throughout the body (the spleen, the thymus gland, and the lymphoid bone-marrow) are in a condition of hyperplasia. This general lymphatic hyperplasia has been found associated with rachitis and with hypoplasia of the heart and aorta. These pathological conditions, having been found frequently in cases of sudden death, give them special interest. Paltauf and others of the Vienna school have studied this condition closely, and believe that persons who suffer from this hyperplasia have lowered powers of resistance and are particularly liable to cardiac paralysis. In England and this country this condition has received little consideration.

SYMPTOMS AND DIAGNOSIS.—The diagnosis of this condition is not always easy (Osler). Enlargement of the superficial glands, enlarged tonsils, more or less swelling of the thyroid, dullness over the sternum, and enlargement of the mesenteric glands are the most prominent features. The signs of hypoplasia of the vascular system are more obscure, though Quinke believes that in these cases the left ventricle is dilated and the peripheral arteries may be much smaller. The subjects of the condition are generally infantile in conformation and poorly developed.

The attention of writers has been principally directed to this condition on account of the frequency with which it has been found in cases of unexpected death from trifling and inadequate causes. Instances of such are cited by Osler. The death of the son of Langhans, of Berlin,

immediately after the preventive inoculation with diphtheria antitoxin; death in another child under similar circumstances; a number of cases of sudden death under anæsthetics, one under Osler's personal observation during anæsthesia for removal of adenoid growths; cases of sudden death of persons who have fallen into the water, and though immediately recovered, were dead, or who have died suddenly while bathing, and referred by Paltauf to this condition; the large group of cases of sudden death in children without recognizable cause, in whom the thymus has been found enlarged (the so-called "thymus tod"). Osler also suggests that certain of the sudden deaths during convalescence from the infectious fevers are referable to this condition. Escherich is inclined to the opinion that certain measures usually harmless, such as hydrotherapy, may have an untoward effect on children who are subjects of lymphatism, and adds that tetany and laryngismus may be associated with it.

Children with the *status lymphaticus*, in spite of their splendid appearance, often sink rapidly under light attacks of the disease. The prognosis in such cases ought, therefore, to be guarded, the more so as such children are often looked upon by their parents as being particularly healthy. Galatti (Wiener med. Blätter, Dec. 10, '96).

PATHOLOGY.—Osler observes that the pharyngeal, thoracic, and abdominal lymph-glands are most frequently affected; the cervical, axillary, and inguinal less so, although they may show slight enlargement. There is usually much enlargement of the lymphatic structures of the alimentary tract, the tonsils, the adenoids of the pharyngeal vault, and the solitary and agminated follicles of the small and large intestines. The hyperplasia of the intestinal lymphatic structures, he notes, may be the

most remarkable, "the individual glands standing out like peas."

The enlargement of the spleen is usually moderate. The Malpighian bodies may be very prominent, and, when anæmic, may resemble "large tubercles." The spleen is usually soft and hyperæmic.

The thymus is enlarged, swelled, and soft, and on section may exude a milky-white fluid. It may measure as much as ten centimetres (3.9 inches) in length.

The bone-marrow is in a condition of hyperplasia, and the yellow marrow of the long bones in young adults, and even in persons between the ages of twenty and thirty, has been found replaced by red marrow. Hypoplasia of the heart and aorta, hypertrophy of the thyroid gland, and, in a large number of cases in children, rachitis are associated with this condition.

TREATMENT.—Clinical data are not sufficient to outline any specific treatment. Further observation and study of this peculiar condition may shed more light upon the clinical features, make clear the method of sudden death in these cases, and, perhaps, point out a satisfactory method of treatment.

Lymphangitis.—Lymphangitis (orrho-selenitis: angioleucitis) is an inflammation of the lymphatic vessels. Two varieties are usually noted. When the superficial lymphatic radicles are involved, the term "reticular lymphangitis" is applied; when the larger continuous lymphatic trunks are affected it is called "tubular lymphangitis" (Bellamy).

Reticular lymphangitis may be observed in its typical form in erysipelas, in which the streptococcus of erysipelas produces inflammation by invading the lymphatic radicles (see ERYSIPELAS). It is also seen in many cases of circumscribed dermatitis attended with more or

less œdema. It is present also in the "erysipeloid" of Rosenbach, where certain patches of superficial inflammation of the skin slowly spread from a point of primary infection (usually on the fingers), the point originally infected returning to its normal condition, while the inflammation extends peripherally, until after one to three weeks the disease has exhausted itself and entirely disappears, having traveled over the hands to the wrists. Rosenbach found in these cases a specific thread-forming, spore-bearing micro-organism derived from decomposing animal matter. In certain poisoned wounds attended by a rapidly extending inflammation, the lymphatic trunks become involved and both varieties of lymphangitis may be present. In injuries of the hands or feet that are neglected or are subject to motion and irritation, or where scratches and abrasions are brought into contact with decomposing matter a lymphangitis of a less virulent type may develop which may at first be confined to a small area of contiguous lymphatic radicles, but may, later, extend to the larger trunks (tubular lymphangitis) leading away from the original focus and appear through the skin as red streaks or lines running in the direction of the lymph-current, these red lines being tender to the touch. These streaks result from the blocking up of the lumen of the lymphatic vessels by a coagulated exudate, infiltrating, additionally, the circumjacent connective tissue, which is also inflamed.

As the infectious matter travels along the lymph-channels, it is carried to the glands into which the lymphatics empty, and inflammation of the lymphatic glands follows, sometimes without inflammation of the afferent duct. A second group of glands may also become affected without any reaction in the ducts

leading from the first to the second group. It is seen, therefore, that any serious inflammation of the ducts leading from the focus of infection to the glands is not necessary for the production of trouble in the latter.

If the infectious matter consists in part of pyogenic organisms of sufficient number and activity, suppuration will result along the course of the inflamed vessels, in the glands, and later in the connective tissue about both, forming abscesses. If the infection is less virulent or becomes weakened through treatment, the inflammation diminishes in severity, the exudate liquefies and is absorbed, and the affected vessels become normal in condition and function.

SYMPTOMS. — Certain constitutional symptoms appear which are dependent upon the severity and extent of the infection. The patient is not infrequently seized with rigors, followed by a febrile action and attended, not infrequently, by vomiting or diarrhœa. These symptoms may precede the local signs of the disease by twelve or fourteen hours, but most frequently accompany them. Examination of the parts, if superficial, will reveal a number of fine, red streaks, at first scattered, but gradually approaching one another so as to form a distinct band, about an inch in breadth, running from the affected part along the inside of the limb to the neighboring lymphatic glands, which have become enlarged and tender. The band itself feels somewhat doughy and thickened. More or less œdema of the limb is present, from the involvement of the deeper layers of vessels and their obstruction by the inflammation. Erysipelatous patches not infrequently appear along the course of the inflamed absorbents, and coalesce until they are of considerable size, and constitute a distinct variety of erysipelas. If the deeper

seated lymphatics are first implicated, the glandular signs are first observed; if the inflammation continues to be confined principally to the deep vessels, it gives rise to a great and brawny swelling of the limb, with much, if any, superficial redness. The constitutional symptoms, at first of an active form, may gradually subside into the asthenic type.

DIAGNOSIS.—The diagnosis of superficial lymphangitis is usually easy. The tender red streaks indicate the tubular variety. The diffuse redness of the reticular form, with its superficial œdema, tenderness, and constitutional symptoms, differentiate it from erythema or dermatitis. From phlebitis it is distinguished by its superficial redness, the inflammation of contiguous glands, and the absence of the knotted corded state which belongs to an inflamed vein; the pain and fever are usually less in phlebitis. Inflammation of the deep lymphatics is not easily differentiated from cellulitis: if glands are early involved, if lymphatic œdema is present, if patches of reticular lymphangitis appear at points of anastomosis with deeper trunks, inflammation of the deep lymphatics may be assumed (Keen and White).

ETIOLOGY.—The etiology of the reticular variety has already been referred to. Tubular lymphangitis is always caused by the entrance into the affected duct of bacteria and bacterial products of more than usual virulence. The absorption of septic matter from infected wounds always follows, but does not generally cause an extensive inflammation of the lymph-channels; impaired constitution or general debility will predispose to it. Frequent irritation of the infected wound or retention of septic secretions in it are frequently exciting causes. Trivial wounds may be infected with virulent septic material (snake-bites, dissection

wounds): bathing the hands in putrid fluid for some time, without any breach of surface, has been followed by lymphangitis.

PROGNOSIS.—The disease usually terminates in resolution at the end of a week or ten days; exceptionally it may terminate in erysipelas. In some cases limited suppuration may take place or a chain of abscesses form along the course of the lymphatic vessels and glands. In other cases, after the disappearance of the inflammatory symptoms, a state of chronic and rather solid œdema (lymphœdema) is left, giving rise to a species of false hypertrophy (see ELEPHANTIASIS). More rarely death results from erysipelas, pyæmia, or from secondary abscesses, especially in patients with impaired constitution, in whom the disease has been extensive and has become associated with low cellulitis.

TREATMENT.—Lymphangitis being a septic disease, the treatment should be conducted on antiseptic lines. The original wound, through which the septic virus has gained entrance into the lymphatic circulation, should be thoroughly cleansed and disinfected. The affected limb should be elevated and kept quiet. Free incision will relieve any tension, and is advised even before the appearance of suppuration. All foci of suppuration should be evacuated by incision, disinfected, and drained. Compresses wet with an aqueous solution of bichloride of mercury (1 to 2000) should be laid upon the affected parts, the compresses being remoistened as they begin to dry, and re-applied until the inflammation has entirely disappeared. The constitutional symptoms usually demand more or less attention, especially in the direction of support and free elimination. Opiates may be needed to relieve pain, but their use should be avoided if possible, as they

diminish the secretions. Quinine and strychnine are valuable in tonic doses. The mineral acids and bitters are useful, as digestion is usually impaired. Nourishing food should be freely administered, and stimulants in the more severe cases. Bandaging and massage will best overcome any œdema which may be left after the acute symptoms have subsided.

Lymphadenitis and Inflammation of the Glands. See ADENITIS.

Lymphangiectasis and Lymphangioma.

—The lymphatic vessels, like the veins, are subject to varicosities and dilatations, which are called lymphangiectasis, or varix of the lymphatics; when these dilatations are large or when several of these dilatations unite to form a distinct tumor, it is known as lymphangioma. Lymphangiectasis has been observed in the superficial and deep lymphatic networks and in the lymphatic trunks. The inner side of the thigh is the favorite location for this disorder, but it has also been seen in the anterior abdominal walls, about the ankle- and elbow- joints, and on the prepuce. In the superficial lymphatics this condition appears first as small elevations, giving the skin an appearance like the rind of an orange; subsequently it appears as small vesicles covered with a thin layer of epidermis. The larger lymphatic trunks are, at the same time, frequently affected in like manner. The vessel may either be dilated cylindrically into round, beaded enlargements, often semitransparent, and but slightly compressible, or ampullæ may be formed on them, giving rise to more or less soft swellings, fluctuating under the finger (Erichsen). There is usually some œdema (lymphœdema) either from obstruction of the lymphatics or from the impeded flow of the lymph; the affected parts may become swollen by a hard, compact, brawny œdema which is not reducible by position

or pressure (lymphœdema). This condition leads up to elephantiasis (see ELEPHANTIASIS).

In a majority of recorded cases a discharge of lymph (*lymphorrhagia*) has been observed, caused by a rupture of the vesicles. This flow of lymph is of variable amount and duration, and is apt to be intermittent in character. There is another form of lymph-discharge which occurs normally from all wounds as a result of rupture or incision of the lymph-radicles or smaller trunks; this is known as *lymphorrhœa*. An excessive discharge of lymph in either manner provokes symptoms of general debility like those induced by hæmorrhage. Rupture of a dilated lymphatic along the urinary tract and the consequent lymphorrhagia produce *chyluria*. If the tunica vaginalis testis be the seat of a lymphorrhagia, *chylocele* results. Varicose swelling of the lymphatics in the inguinal regions may simulate hernia. Dilatations of the blood-vessels may co-exist with those of the lymphatics, producing a mixed tumor. When such mixed growths occur in the tongue, they produce an enlargement of the organ known as "*macroglossia*"; when occurring in the lips, this enlargement is known as "*macrocheilia*."

A large proportion of cases of lymphangiectasis are congenital in their origin. These cases may be due to vicious development of unknown character or to obstructions to the lymph-stream of a mechanical or inflammatory nature during intra-uterine life. Inflammation and thrombosis are the usual causes of the acquired variety, resulting in a dilatation of the radicle and primary channels, with lymph-stasis and œdema of all the tissues supplying the narrowed or occluded vessels. Cicatricial contraction, pressure by tumors, or occlusion of the lymph-channels by tuberculous or cancerous material

may also be etiological factors in producing this condition. In a large class of cases occurring in tropical regions, the presence of the *Filaria sanguinis hominis* in certain lymphatic vessels has been shown to be the cause of lymph-thrombosis and inflammation. (See PARASITES.)

TREATMENT.—Circumscribed dilations and isolated cystic enlargements may be removed by the knife. Massage, the elastic bandage, and support in an elevated position will give relief in the diffused dilatations and œdema due to persistent obstructive causes, in cases in which collateral lymphatic circulation may become sufficiently developed to relieve the stasis; when such collateral circulation is not developed and stasis is not relieved, these means will not suffice. If all other means fail, ligation of the main artery of supply to the limb would be justifiable. In a few recorded cases rapid improvement has followed; in others none. Amputation may be done, if the condition is confined to an extremity and causes serious annoyance. Similar tumors involving the genitals should be excised, care being taken to preserve the penis and testes by dissecting them out of the diseased mass. The use of the elastic bandage about the base of the growth will prevent hæmorrhage during the operation and facilitate the dissection (Keen and White).

Lymphadenoma.—Lymphadenoma, or simple lymphoma, is a tumor composed of tissue exactly resembling the cortical substance of a lymphatic gland—the so-called “adenoid tissue of His”; in fact, the change is purely an hyperplasia of normal gland-elements. (See TUMORS.)

Malignant Lymphoma (Hodgkin's Disease; Pseudoleukæmia). (See PSEUDO-LEUKÆMIA.)

Sarcoma of Lymphatic Glands, or

Lymphosarcoma.—This is a condition in which sarcoma attacks a lymphatic gland. In the early stages it differs little from other glandular hypertrophies, but later it manifests its malignant character by involving adjacent tissues and by the appearance of secondary deposits in the various internal organs. In its early development it may be excised, together with the surrounding tissue. If return occurs and the tumor be on one of the limbs, immediate amputation is imperative.

C. SUMNER WITHERSTINE,
Philadelphia.

STOMACH AND INTESTINES, SURGERY OF.

Surgery of the Stomach.

PRELIMINARY MEASURES.—When possible, it is specially desirable to clear the intestinal tract by a thorough purge, and, as preliminary to most operations, it is of great advantage to wash out the stomach. These measures are of unusual importance in gastric surgery; first, because they lessen the danger of contamination of the peritoneum by the escape of the gastric contents, and, secondly, because they lessen the likelihood of post-anæsthetic vomiting and retching. These, in some instances, if severe, may entirely defeat the end of the operation by causing the sutures to give way.

Surgical Treatment of Gastric Ulcer.

—Surgical treatment may be indicated in certain cases of non-perforating gastric ulcer; but immediate operation is always indicated in cases of perforating ulcer. Operation is always indicated in non-perforating ulcers which give rise to dangerous and repeated hæmorrhage and extremely severe pain and intractable vomiting and indigestion, provided all medical measures have been tried without avail. It is also indicated if there is any

suspicion of malignant degeneration. In case of hæmorrhage, operation is indicated only when the loss of blood has been excessive, whether from frequent small hæmorrhages or more than one severe hæmorrhage. After severe hæmorrhage excision of the ulcer and suturing by Lembert or Halsted sutures is probably the preferable operation, for erosion of a large blood-vessel is usually present. In less severe hæmorrhages gastro-enterostomy or pyloroplasty may be performed; these operations, by favoring emptying of the stomach, tend to put the ulcer at rest, and in some instances have been combined with excision, it has been thought, with advantage.

Literature of '97-'98-'99.

The duration of life after perforation of the stomach may be estimated at twenty-four hours; hence the importance of early and distinct diagnosis cannot be exaggerated. The shock following perforation is severe, and its effects can be observed to increase so rapidly that it is apparent the chances of success are diminishing in direct proportion to the length of time that is allowed to elapse between the occurrence of the injury and its repair by surgical means. Morse (*Brit. Med. Jour.*, Feb. 13, '97).

Out of a series of 187 cases of gastric ulcer that have been treated in the Massachusetts General Hospital in the last 10 years, 22.8 per cent. were "well" or "relieved" when discharged from the hospital, and 54 of 110 cases were permanently relieved by treatment. Of these 187 cases probably 14 per cent. were suitable for operation; not including the 39 cases of relapse. J. Collins Warren (*Boston Med. and Surg. Jour.*, Sept. 29, '98).

The most important factor influencing the result of a laparotomy for a perforated gastric ulcer is the length of time which has elapsed since the perforation. In no recorded case has recovery ensued if the operation has been postponed for more than twenty-four hours

unless extensive peritoneal adhesions existed prior to the perforation. F. S. Toogood (*Lancet*, Jan. 15, '98).

Twenty-one cases of simple ulcer of the stomach personally operated upon with but a single death. The indications for operation are recurrence of ulceration with marked deterioration of general health; resistance to medical treatment followed scrupulously for a long period; intense pain, especially when accompanied by obstinate vomiting; recurrent hæmatemesis; emaciation and cachexia; gastric dilatation; the formation of a palpable tumor, and the development of an extensive adhesive peritonitis. Gastro-enterostomy is preferred, and is applicable in all cases, no matter what may be the state of the lesion. Tricomi (*Revue de Chir.*, Feb. 10, '99).

Cases of gastric ulcer occurring at the Massachusetts General Hospital during the years 1888-98, inclusive, studied. In 187 cases hæmorrhage was present in 81 per cent., and caused death in 17 per cent. of the male patients, but only in 1.27 per cent. of the females. No woman under thirty years of age died of hæmorrhage. Perforation occurred in 3.2 per cent. of the cases, and all of these proved fatal. Of 114 patients, 80 per cent. were discharged cured or relieved, but at the end of an average of five years only 40 per cent. remained well. The mortality in these from gastric disease was 20 per cent. Among the males it was 30 per cent.; with the females, 9 per cent. The mortality of 8 per cent., and the failure of medical treatment to effect a lasting cure in 60 per cent. of the patients, indicate the need of surgical intervention in other than emergency cases of this disease. Greenough and Joslin (*Amer. Jour. Med. Sci.*, Aug., '99).

PERFORATION IN GASTRIC ULCER.—Perforation may perhaps be considered the most dangerous complication of gastric ulcer. Welch has placed the entire mortality from gastric ulcer at 15 per cent., and he states that 6.6 per cent. of the cases die from perforation.

The diagnosis is usually not difficult.

It is based, first, upon the history of the illness in which there have almost invariably been present the symptoms of gastric ulcer or of chronic gastric catarrh; and, secondly, upon the severe pain which is located in the left hypochondrium or epigastrium, and is often accompanied by vomiting and collapse. (See STOMACH, DISEASES OF.)

Literature of '97-'98-'99.

As a point in diagnosis in perforating gastric ulcer attention is called to the outstretched legs, which is of value, pointing, as it does, to disturbance in the upper portion of the abdomen. On the contrary, if the knees are drawn up there is a disturbance in the lower part of the abdomen. R. H. Marten (*Australasian Med. Gaz.*, Sept. 20, '97).

Perforation is met with more frequently in the anterior wall and more commonly near the cardia than the pylorus. In some cases perforation of both walls has been found. During the first sixteen years after Mikulicz performed the first operation 78 operations were reported, but in recent years the number of operations have rapidly increased until, in the year following May, 1898, 57 operations were reported. This is probably due to the fact that physicians recognize the condition earlier and promptly call surgical aid rather than that the number of cases of perforations has increased. As a rule, perforation occurs very suddenly without any apparent exciting cause, although violent exertion or traumatism have sometimes been the immediate cause.

Gastric ulcer is one of the commonest of diseases, it having been estimated that of the population of Europe 4 or 5 per cent. labor under it. Some have estimated as high as 13 per cent., and Fiedler, who examined post-mortem 2200 stomachs, found ulceration or its scar in 20 per cent. of the women and

1½ per cent. of the men. Ewald says that ulcer forms especially in the greater curvature and in the pyloric region. The ulcer is usually single, but two or more may be present, and Orth says that in 20 per cent. of the patients with gastric ulcer more than one ulcer is present. Weir and Foote (*Med. News*, Apr. 25, '96).

Operation.—As soon as the diagnosis is established with any degree of certainty, all food should be withheld and preparation should be made for immediate operation. When the diagnosis is considered absolutely certain, the incision is perhaps best made parallel to the border of the ribs, as most gastric ulcers perforate near the cardia and lesser curvature. In case of doubt, a median incision would be preferable. Careful search should then be made, first of the anterior wall of the stomach, beginning near the cardia, taking next the pylorus, and, finally, the posterior wall, the positions named being given in order of the relative frequency of perforation. The edges of the ulcer are inverted and one or two rows of Halsted or Lembert sutures are inserted. The excision of the ulcer is unnecessary in the great majority of cases. Special care should be taken that the entire ulcer is invaginated, and careful search should be made for a second perforation or dangerously thin area. Needless fatalities have resulted from the neglect of both of these precautions. If it is impossible to invaginate the edges of the ulcer, they may be drawn together by sutures as a cutaneous wound would be sutured, and in case of possible insecure suture, an omental graft may be sewed over as an additional safeguard. In case neither of these procedures is possible, because of the fixation of the stomach by adhesions or great inflammatory thickening, the abdominal cavity should

be walled off by iodoform gauze and a drainage-tube introduced down to the ulcer. The resulting fistula will usually close spontaneously, or, if necessary, it may be closed by a later plastic operation. After suturing the ulcer the most thorough cleansing of the peritoneal cavity is of the utmost importance; thorough flushing with large quantities of warm sterile salt solution should be carried out and any suspicious spots may be wiped clean with gauze. In order that all parts of the abdominal cavity be reached it may be necessary to separate peritoneal adhesions, and in some cases counter-openings may be made. Drainage is usually desirable, not only from the site of operation, but also from the pelvis.

In the after-treatment of the cases external heat, stimulating enemata, subcutaneous use of stimulants, and intravenous infusions of salt solution may be called for if severe shock is present. In order to give the stomach rest, nourishment is usually given by nutrient enemata for the first five or seven days. Capsulated collections of pus, which sometimes result from peritoneal infection, are best opened from an external incision, as the separation of adhesions may give rise to general infection. Success in this operation depends mainly upon early diagnosis and operation and thorough cleansing of the peritoneal cavity.

Patients operated upon within twelve hours from the time of perforation have excellent prospects for recovery, the mortality being about 16 per cent. in cases operated upon since 1896. Other factors of importance are the condition of the patient at the time of operation, the amount of food contained in the stomach at the time of perforation, and the skill of the operator. The entire

mortality in the cases thus far reported has been about 49 per cent.

Literature of '97-'98-'99.

Seventy-eight cases of operation for perforated gastric ulcer collected by personal assistant, Dr. Tinker, as compared with the 78 collected by Weir and Foote in 1896.

1. Age and sex: Of Keen and Tinker's 78 cases, 9 were men and 61 women; in 8 cases the sex was not recorded. All the men were over 25 years of age. Of the women, 41 were under 25 and only 16 over that age. The age was not stated in 4 cases.

2. The site of perforation was in the following situations in decreasing order of frequency: On the anterior wall, near the cardia, near the lesser curvature, near the pylorus, and on the posterior wall.

3. Ulcers not found: The number of cases in which the ulcer was not found at the time of operation has been very much less in recent cases than in those reported a few years ago. This has been partly due to the fact that more recent operators have had less hesitation in breaking down adhesions.

4. The mortality has been progressively reduced. Of Weir and Foote's cases, 55 died and 23 recovered, giving a mortality of 70.51 per cent. Of the cases collected by Keen and Tinker, 28 died and 50 recovered: a mortality of 35.89 per cent.

5. The mortality in relation to time of operation: An analysis of the 156 cases shows the following:—

TIME OF OPERATION AFTER PERFORATION.	TOTAL.	DIED.	RECOVERED.	PERCENTAGE OF MORTALITY.
Under 12 hours	49	14	35	28.57
12 to 24 hours...	33	21	12	63.63
24 to 48 hours...	27	21	6	77.77
Over 48 hours...	33	17	16	51.51
Not stated.....	14	10	4	
Total.....	156	83	73	53.20

If one wishes to have any reasonable prospect of recovery, the case must be operated on within the first twelve hours.

and practically the earlier the better. W. W. Keen (N. Y. Med. Jour., May 7 and 21, June 4 and 11, '98).

Gastrolýsis.—Gastrolýsis—*i.e.*, freeing the stomach from adhesions—is an operation that has been found necessary in a considerable number of cases in which extensive adhesions have given rise to decided disturbances of digestion or to severe pain.

There are no positively distinctive symptoms of this condition, and consequently the diagnosis is very difficult. The cause of trouble has seldom been determined before operation. Strong, band-like adhesions may give rise to constriction or obstruction of the bowel.

By far the most common cause of such adhesions is gastric ulcer, but they may result from a peritonitis or from inflammatory conditions involving neighboring organs, such as the colon, pancreas, spleen, liver, gall-bladder, or abdominal wall. Another cause is injury, whether operative or accidental.

Operation.—Coeliotomy and division of the bands or breaking up the adhesions is usually followed by perfect relief. As hæmorrhage sometimes results from the division of adhesions, it is best to cut band-like adhesions between ligatures when possible. The denuded surface left by the separation of adhesions should be covered with omentum if possible to prevent their forming again. In certain cases of very extensive adhesions, producing hour-glass contraction of the stomach or stenosis of the pylorus, gastropasty or resection may be necessary.

Gastroplication, or Gastrorrhaphy.—Gastroplication (this term being preferable) is an operation which consists in making a fold in the stomach-wall and suturing it, for the relief of chronic dilatation. If the dilatation is due to malig-

nant pyloric stenosis, pylorotomy, gastro-enterostomy, or gastrectomy would be indicated instead of this operation. In dilatation resulting from non-malignant stenosis pyloroplasty would probably be the preferable operation. Gastroplication is thus mainly limited to the treatment of those cases in which stenosis is not present and in which the dilatation is excessive.

Operation.—After opening the abdomen the anterior wall of the stomach is folded on itself by lifting up the greater curvature to the lesser curvature, and it is held in this position by two or more rows of sutures. Certain operators prefer the use of purse-string sutures. Sufficient time has not elapsed to determine definitely the permanent results of this operation, but the unanimous verdict of those who have performed the operation is in its favor. Seventeen operations have thus far been reported, with only one death.

Gastropexy.—Gastropexy is the term used to designate the operation for fixing the stomach to the anterior abdominal wall by suture. The operation has been performed for the relief of gastrop-tosis, or sagging of the stomach (Glénard's disease), which is with difficulty distinguished from dilatation. It has been successfully performed in three cases, but gastroplication or gastro-enterostomy seems to be preferred in the majority of cases.

Gastro-gastrostomy, gastropasty, and gastro-anastomosis are operations performed for the relief of hour-glass contraction of the stomach.

The most common cause of hour-glass contraction of the stomach is due to adhesions following gastric ulcer, but the condition may be congenital or may be developed in adult life without any known cause. A differential diagnosis between

this condition and obstruction due to pyloric stenosis is, in many cases, almost impossible, for the symptoms of these conditions are practically identical. If severe disturbances of digestion arise, as is often the case, one of these operations would be indicated.

GASTRO-GASTROSTOMY. — In this procedure an opening is made in each of the two gastric pouches, and a free communication is established between them by the anastomosis of the opening. The operation is sometimes known as Wölfler's operation for hour-glass contraction of the stomach. It has been performed in five cases, with one death resulting. In gastroplasty a longitudinal incision is made in the constricted portion between the pouches of hour-glass stomach; this incision is stretched at a right angle and sutured, as in the Heineke-Mikulicz operation of pyloroplasty. It has been successfully performed in seven cases. Watson, of Boston, has performed the operation of gastro-anastomosis in one case, by the following method: The pouches of the hour-glass stomach are folded on the constricted portion as a hinge; the anterior wall of the stomach is incised to give access to the double septum between the pouches; an opening is cut in the double septum, which is then sutured, and the incision in the anterior stomach-wall is closed. In case of adhesions fixing either pouch, this method would, of course, be impossible. The three operations seem to be equally successful, and the one selected would depend entirely upon the conditions found in each case. Gastroplasty would perhaps be the simplest operation if the constriction was not great. In case of a narrow constriction connecting the two pouches gastro-gastrostomy or gastro-anastomosis would probably be more applicable,

though the latter would be impossible in case of adhesions.

Literature of '97-'98-'99.

In hour-glass stomach gastro-anastomosis as carried out by Wölfler is the most rational and the safest. It establishes a broad communication between the cardiac and pyloric ends, and at the same time lightens the task of expelling food from the already dilated cardiac portion by the deep location at which the anastomosis is established. For the last reason especially it is to be preferred to resection and pyloroplasty, with the establishment of the anastomosis nearer the small curvature. J. Hochenegg (*Wiener klin. Woch.*, May 26, '98).

Gastrotomy.—The term "gastrotomy" has sometimes been used to designate an incision into the abdomen, but ordinarily it is used to mean an incision for opening the stomach.

The operation is performed for the removal of foreign bodies from the stomach; for the relief of stricture of the œsophagus; for exploration in case of doubt as to pathological conditions within the stomach; and as a preliminary to certain operations,—for instance, Loreta's method of divulsion for stricture of the pylorus or in performing gastro-anastomosis by Watson's method.

Exploratory gastrotomy has been performed in a considerable number of cases in order to determine the diagnosis of pathological conditions, such as hæmorrhage arising from erosion of the arteries or small ulcers, incipient carcinoma, polypi of the mucous membrane, and other obscure conditions in which no positive diagnosis could be reached by other means. In most cases the diseased condition has been found and successfully treated and recovery has thus far followed in every case. The slight danger from the operation and the

certainty which it gives as to the cause of trouble makes the operation thoroughly justifiable.

Literature of '97-'98-'99.

Instead of proceeding for months in treatment by medication of obscure gastric troubles an exploratory operation should be undertaken. In this way carcinoma of the stomach could be discovered sufficiently early in many cases to allow of removal, which would probably result in permanent cure. This procedure has been recommended by Kocher and Keen. Certain cases of apparently purely functional disturbances have, in some way, been relieved by exploratory operation. Ernest Maylard (*Lancet*, Apr. 8, '99).

Gastrotomy for the removal of foreign bodies is indicated when there is severe or continued pain or discomfort present, whether accompanied with nausea, vomiting, and hæmorrhage or not. It is also indicated for the removal of such foreign bodies as cannot pass through the intestinal tract or can only pass with great risk. Sharp or jagged bodies, such as bits of glass, pins, knife-blades, etc., have often been well tolerated by the stomach. Concretions of smaller bodies—such as fish-bones, cherry-stones, date-stones, pebbles, and masses of hair—sometimes give symptoms requiring their removal. As a rule, any concrete substance the size of which allows it to pass the cardia will pass the pylorus without difficulty; but this is not true of long bodies.

Literature of '97-'98-'99.

Gastrotomy, simple incision followed by immediate closure of the stomach, is done first and principally for the purpose of removing foreign bodies from the gastric cavity. These may have been swallowed or been found in the stomach. The operation is indicated: 1. If the swallowed body is not smooth, but irregular, with sharp edges which may injure

the tissues. 2. If it is too large to pass through the pylorus and at the same time gives rise to disturbances: pains, nausea, vomiting, etc. 3. In rare instances in order to examine the interior of the stomach with reference to the presence of malignant superficial neoplasms, ulcers, or ruptured blood-vessels in the case of profuse hæmorrhage. Max Einhorn (*Med. News*, Nov. 25, '99).

Very frequently the foreign body may be felt through the abdominal wall, and the history of the case generally leaves little doubt as to the diagnosis. If there is any question as to the cause of the condition in the case of children, insane persons, etc., the use of the x-rays will often clear up the doubt.

Gastrotomy for the relief of stricture of the œsophagus may be necessary in cases in which it is impossible or undesirable to dilate by means of a bougie passed by the mouth. If the œsophagus is dilated or pouched above the stricture, or if the stricture is situated low down near the stomach, dilatation is often practically impossible except after gastrotomy. A close constriction may be divided by Lange's specially constructed knife-blades or by Abbe's bowstring method; in other cases in which the stenosis is less marked, immediate dilatation by bougies or the fingers may be practiced. In such cases it is sometimes possible to close the stomach immediately. If the stricture is more extensive, however, repeated dilatation is generally required, and a temporary gastric fistula may be established. This will either close spontaneously or may be closed by a subsequent operation.

Operations.—Abbe's Bowstring Method.—A firm cord is passed into the œsophagus through the mouth or—perhaps better—through an opening into the œsophagus in the neck: it is carried through the œsophagus into the stomach and out through the gastric incision. A

bougie is then introduced to the site of stenosis, making the stricture tense, and the string, when sawed back and forth, divides only the tense stricture, and not the relaxed portion of the œsophagus.

Loreta's operation for stenosis of the pylorus consists in dilatation, either by means of instruments or by the fingers after preliminary gastrotomy. The mortality by this method of operation has been considerably greater than after pyloroplasty, and for this reason, as well as from the fact that the pylorus often recontracts, the operation has fallen into disfavor.

General Operation.—The introduction of 8 or 12 ounces of sterile milk or water into the stomach before operating may prove of aid in locating the organ accurately. Some surgeons have suggested distension of the stomach by large quantities of gas, but in case ulceration is present, or if the stomach-wall is nearly perforated by a foreign body, or if it is friable from disease, this procedure is not without danger of rupture and subsequent infection of the peritoneum.

The incision may be made parallel to the lower border of the left ribs, or, in case of Loreta's operation or in operation for the removal of a large foreign body, in the median line. Before opening it the stomach should be brought out of the abdominal cavity if possible and carefully examined to make certain that the stomach, and not the transverse colon, is being dealt with. The colon is recognized by its longitudinal muscular bands, its sacculations and the presence of the epiploicæ. Iodoform gauze should be packed about to avoid danger of contamination of the peritoneum, and a continuous circular fixation suture is of advantage for the same reason, as well as that it holds the organ firmly during the operation. The line of in-

cision in the stomach-wall is perhaps best made parallel to the course of the blood-vessels,—that is, transversely to the curvatures; but much will depend upon the object of the operation. After this is accomplished the opening is closed by Lembert's or Halsted's mattress-sutures and the abdominal wound is closed without drainage.

Gastrostomy.—Gastrostomy is the operation by means of which a permanent fistula is established through the abdominal and gastric walls for the purpose of introducing food.

The operation is indicated to prevent death from starvation in case obstruction exists in the digestive tract above the stomach which prevents the introduction of food. Such obstructions arise from congenital closure, syphilitic stricture, diverticulum, or cicatricial contraction of the œsophagus, which may be caused by destruction of its walls from caustic chemicals, traumatism, scalding water, or eruptive fevers, such as typhoid fever. The obstruction may also result from the pressure of growths outside the œsophagus, but benign growths of the thorax, neck, or of the walls of the œsophagus are comparatively rare. Aneurisms of the aorta or the innominate artery or tumors of the larynx are also possible causes of obstruction. Probably the most common source of obstruction is cicatricial contraction and malignant disease of the œsophagus or cardia. Epithelioma is the most frequent variety of malignant growth found in this locality.

As already stated under (ESOPHAGUS (volume v), the objective signs are obtained by passing the œsophageal bougie and by auscultation. Sufficient emphasis can hardly be made upon the fact that the bougie should be soft and flexible, and should be passed with great

care, as deaths have been reported from rupture of aneurisms, perforation of the pleura and of the œsophagus itself, even by skilled surgeons. Considerable familiarity with the sounds of deglutition in normal and diseased conditions is necessary in order that auscultation may prove of any decided help as a means of diagnosis.

Operation.—In the earlier operations the stomach was simply fixed to the abdominal wall by means of sutures, and was opened directly; but considerable difficulty arose because of the escape of the gastric contents, and the consequent excoriation of the skin. Various methods have been devised of late to obviate this difficulty. Whatever method of operation is adopted, the stomach should not be fixed too near the pylorus, otherwise the escape of gastric contents into the intestine is hindered.

The Ssabanajew-Frank operation was devised independently by those two surgeons, the technique of both being similar. It is generally preferred for the reason that by it the escape of gastric contents is avoided, as well as the necessity for wearing a tube. In this method an incision is made along the left costal border, and the stomach is seized and drawn out into a cone until the lesser curvature appears. The base of the cone is firmly sutured in the incision by deep fixation stitches, and a second incision two to three centimetres long is made about two or three centimetres above the costal border; the skin between the incisions is undermined, the apex of the cone of stomach is passed under this bridge of skin, drawn out of the second incision, and fastened by sutures. The obliquity of the canal and the pressure of the strip of skin prevent leakage, and a tube is inserted only when food is given. The abdominal incision

is closed immediately, and the apex of the cone of stomach is opened. It is very essential that the sutures hold absolutely tight, in order to prevent infection of the peritoneum and to prevent accumulation of secretion and the formation of a superficial abscess.

Witzel's method may be used in case the stomach is so firmly contracted that it is impossible to draw out a sufficiently long cone to pass under the bridge of skin. According to this method, after opening the abdomen and walling off the field of operation with gauze, a small drainage-tube is laid in a vertical direction on the anterior surface of the stomach near the cardia, and the stomach-wall is sewed together from both sides over it, the sutures passing through the serosa and one of the muscular layers. After one and one-half to two centimetres of the tube have been buried in this way a small opening is made through the stomach-wall at the lower end of the tube and the tube is pushed into the stomach a distance of six to eight centimetres. The stomach is securely sutured about three centimetres beyond the distal end of the tube, and the parietal incision is then closed about the tube. The external end of the tube is then kept closed by a clamp, except at the time of feeding. The mortality from the operation is about 25 per cent. in malignant cases. There can be no doubt that it would be much reduced if the operation were generally undertaken earlier, before the patients were much weakened by the disease.

Feeding by Gastric Fistula.—The food should, at first, be given in small quantities and should be of such a nature as to be readily absorbed. Peptonized milk or pounded beef may be administered alternately with starchy and fatty food. Half a pint of food given slowly every

four hours is a fair average as to quantity and frequency. After feeding by the fistula for some time it may be possible to somewhat increase the quantity and the interval, as too-frequent feeding irritates the stomach and the fistula.

Pyloroplasty. — Pyloroplasty is the term applied to the enlargement of a stenosed pylorus by plastic operation.

It is the operation of choice in simple non-malignant stenosis of the pylorus unless there is excessive fibroid thickening, recontraction of the pylorus, or possibly in case of excessive dilatation, when gastro-enterostomy is the preferable operation.

The Heineke-Mikulicz operation was devised and performed independently by the surgeons whose names it bears in 1886-87. According to their method, an incision is made in the long axis of the pylorus at the seat of constriction; the incision is then stretched at its middle at a right angle so as to dilate the strictured pyloric opening, and the margin of the incision is sutured in this new position, the edges being inverted so as to bring the serous surfaces in apposition. The advantages over gastro-enterostomy are its lower mortality, the absence of reflux of bile and pancreatic fluid into the stomach, and ultimately, in many cases, the restoration of normal pyloric action and normal gastric secretion. The mortality varies with different operators from 7 to 21 per cent.

Gastro-enterostomy. — Gastro-enterostomy is the operation of establishing a permanent fistula between the stomach and some part of the small intestine.

Its main object is to aid in quickly and easily emptying the stomach of its contents. The operation may be absolutely necessary to prolong life in certain cases of obstruction of the pylorus, and it often proves of great benefit in

such conditions as gastric ulcer and obstinate disturbance of digestion. In malignant diseases of the pylorus pyloroplasty is the operation of choice if the disease has not progressed too far, otherwise gastro-enterostomy is indicated. In the non-malignant forms of pyloric obstruction this operation is to be preferred, if the stenosis is extreme, the thickening very great, or in case of recurrent stenosis; in other non-malignant cases pyloroplasty is the operation of choice. It has been performed with encouraging success, especially by the French surgeons, in the treatment of obstinate digestive disturbances, particularly those associated with gastric ulcer.

Literature of '97-'98-'99.

Special stress laid upon the employment of gastro-intestinal anastomosis for all varieties of pyloric stenosis, no matter what its cause. Gastro-enterostomy is the most frequently indicated operation. The anastomosis is personally preferred in the posterior wall at the most dependent point, a simple suture in two rows being made with an ordinary sewing needle. The removal of the pylorus should be applied only to cases of malignant nature, but the simple entero-anastomosis in inoperable-cancer cases is a much better surgical procedure than the formation of an artificial anus in cases of cancer of the intestines. Tuffier (*La Presse Méd.*, Feb. 9, '98).

Early surgical intervention is advocated in cases of cancer of the stomach. There are twenty instances on record of patients who have survived without recurrence the removal of gastric tumors proved to be malignant after intervals varying from four to eight years. Landouzy (*Bull. de l'Acad. de Méd.*, No. 10, '99).

Operation. — A median incision between the ensiform cartilage and umbilicus is generally preferred. In order that digestion and absorption be not interfered with, it is important that the

upper part of the jejunum be selected for anastomosis. The beginning of the jejunum is the only fixed part of the small intestine, and it can usually be found without much difficulty just below the pancreas, to the left side of the vertebral column, near the root of the mesentery. A freely-movable loop of bowel should be selected, and the upper end of the bowel should be turned toward the cardia, so that the peristaltic waves of the stomach and bowel shall be in the same direction. The anastomosis of the intestine with the anterior wall of the stomach is the easiest method of performing the operation, but in most cases, and especially if severe digestive disturbances are present, posterior gastro-enterostomy, or suturing the intestine to the posterior wall of the stomach after passing it through an opening in the gastro-colic omentum, is the preferable operation. In any case it is desirable to make the anastomosis at the most dependent part of the stomach near the greater curvature, to favor emptying the organ. Union may be effected by direct suture or by means of some of the numerous buttons, plates, rings, bobbins, or anastomotic forceps that have been devised for this purpose.

Of the various mechanical contrivances, Murphy's button has been most generally used. Continuous purse-string sutures are placed around the margins of the incision and the openings are drawn closely around the halves of the button; the halves are then joined and locked, and the operation is complete. If the condition of the stomach and intestine and the general condition of the patient permit, union by suture is perhaps safer, and the Laplace anastomotic forceps or those of Downes are aids of great value. Whatever method of union is chosen, the intestine is first squeezed empty

and clamped on both sides of the proposed incision, leaving a clear space of 10 or 12 centimetres. An incision may be made in the long axis of the gut, or, as Kocher recommends, transversely to the axis of the gut through one-half its circumference on the free border. A fold of gastric wall is pinched up near the greater curvature and an incision of the same length as that in the intestine is made. The jejunum is then sutured to the stomach in a position perpendicular to the greater curvature, thus favoring free escape of gastric contents. If the method by suturing is adopted, the ends of the two incisions are united by separate single sutures and the lower or posterior lips of the incisions are united by continuous suture which perforates all the coats; the anterior or upper lips are sutured in the same manner, except that, to facilitate their insertion, the stitch-loops are left loose and not tied until all have been inserted. The edges are carefully inverted as the sutures are tightened, so as to bring the serous surfaces into apposition, and a second row of Lembert or Halsted sutures are usually placed to reinforce the first, passing through the serous, muscular, and submucous coats. The mortality of gastro-enterostomy is about 35 per cent. for malignant cases operated upon during the past few years; in non-malignant cases it is much less.

Literature of '97-'98-'99.

The prognosis of operation upon the stomach has definitely improved. In the past two and a half years, there have been personally noted 29 cases of gastro-enterostomy, 17 cases of resection, and 22 cases of gastrostomy. In most of the cases the condition dealt with was carcinoma, but there were three cases of benign stricture of the pylorus. In all but three cases the immediate operative result was perfect. The following were

the final results: 26 gastro-enterostomies, with 16 deaths, or 62 per cent.; 13 resections, with 9 deaths, or 69.2 per cent.; and 22 gastrostomies, with 12 deaths, or 54 per cent. mortality. The limitations of the indications for operation, which are very variable, cause the statistics to vary. Ewald (*Centralb. f. Inn. Med.*, Sept. 25, '97).

Pylorectomy.—This term is generally used to designate the operation of resection, not only of the pylorus, but of as much of the duodenum and of the stomach as is diseased.

Almost the only indication for the performance of this operation is carcinoma of the pylorus, although it has been practiced in a number of cases for ulcer and cicatricial contraction. The encouraging results following this operation in the hands of skillful and experienced operators during the past few years seem to indicate that it is the coming operation for the treatment of carcinoma ventriculi. Physicians who are in doubt as to the possible existence of carcinoma should consult with a surgeon early, for, in the present state of medical knowledge, it is impossible to determine absolutely the existence of carcinoma in its incipency. An exploratory operation is of slight danger, and if the disease exists, and the operation is to be more than palliative, it must be undertaken early. Considering the harmlessness and simplicity of exploratory celiotomy, and the fatal consequences of delay, it seems not only justifiable, but urgent, that, if obstinate gastric disturbances do not yield to medical means, operation should be undertaken, even in the absence of a palpable tumor. Factors of aid in the diagnosis are the existence of cachexia, age past 40, the absence of free hydrochloric acid, the presence of the Oppler bacillus, excess of lactic acid, hæmatemesis, and diminished

amount of hæmoglobin and number of red blood-corpuscles.

Operation.—Considering the severity of the operation, preparation should be made for maintaining the body-heat of the patient, for free stimulation, and the intravenous injection of salt solution. A median incision between the ensiform cartilage and the umbilicus is usually made, and the field of operation is walled off with iodoform gauze to avoid infection of the peritoneum. Various methods of operation have been employed. Billroth resected the tumor, and, as the opening in the stomach is so much larger than that in the duodenum, the stomach wound was partially closed by suture until an opening was left of sufficient size for an end-to-end anastomosis with the duodenum. In order to facilitate the escape of gastric contents, the point selected for anastomosis should be below the upper or middle of the gastric opening, depending upon the amount of growth resected. Kocher first clamps both the stomach and the duodenum, resects the growth, and closes the wound in the stomach first by continuous deep sutures, then covers these by continuous Lembert suture; he then makes a posterior end-to-side anastomosis by inserting the duodenum into the opening in the posterior wall of the stomach. When the duodenum is not freely movable enough to allow it to be drawn up for the insertion of circular sutures, he prefers to use the Murphy button; in other cases he uses sutures. Czerny first performs posterior gastro-enterostomy with Murphy's button and then, after resection of the tumor, he closes the stomach and duodenum. The Laplace or Downes forceps may be used in any of these procedures with advantage. The mortality of the operation has always been great,—in cases complicated by ex-

tensive adhesions about 72 per cent.; but a considerable number of cases have been reported in which patients have survived the operation two or five years, and one of Kocher's patients is living and in good health nine years after the operation. In the practice of skillful operators the mortality is believed to be 39 or 49 per cent., while several individual operators have attained over 75 per cent. of successes.

Gastrectomy.—By the term "gastrectomy" should be understood the removal of the entire stomach; but as recent investigations have seemed to indicate that it is impossible to distinguish a well-marked boundary-line between the epithelium of the stomach and œsophagus, it is difficult to say when the entire organ is removed. Probably a considerable number of cases that have been reported as total removals of the stomach have, in reality, been only partial gastrectomies. The operation may possibly be indicated in cases of very extensive malignant growths which have not involved or become extensively adherent to neighboring organs and which have not caused metastases. It should certainly be performed only in the rarest and most unusually favorable cases, and only by surgeons of skill and wide experience in abdominal surgery. Sufficiently extensive operations to deserve the name of total gastrectomies have been performed in 11 cases, with 5 recoveries. Death resulted from recurrence of the growth in the case of 2 of these patients and from peritoneal infection in a third. No reports of the later results have yet been given in the other 2 cases.

Operation.—The gastro-colic and gastro-hepatic ligaments are first tied and divided: then, after carefully packing gauze about to prevent possible peri-

toneal infection, the pyloric end is divided from the duodenum between double clamps; the œsophageal end is then divided in a similar manner. In several cases the duodenum has been found sufficiently movable to make an anastomosis with the œsophagus. This was done, in the cases of two patients that recovered, by means of a Murphy button. If it is impossible to bring the duodenum up to anastomose with the œsophagus, the end of the duodenum is closed and a loop of jejunum is brought up and an end-to-side anastomosis with the œsophagus is made.

Literature of '97-'98-'99.

Case of removal of the entire stomach for carcinoma by successful œsophagoduodenostomy. The patient was a woman of good constitution, aged 66.

On opening the abdomen the tumor was found to comprise nearly half of the wall of the stomach; there was no marked glandular involvement or adhesions, and it was determined to remove the whole organ. The greater and lesser omentum were tied off and divided; the duodenum was clamped and a ligature was placed around it half an inch above the clamp, and the tissues were divided between the two. The ends were washed in salt solution and wrapped in iodoform gauze. The same method was employed with the œsophagus and the cardiac end of the stomach. It was found that the œsophagus and duodenum could be brought together, and they were united by a Murphy button to shorten the operation. No Lembert sutures were applied, as the approximation was good. The peritoneum was closed by catgut suture and the abdominal incision by silk-worm gut. There was practically no loss of blood. The operation lasted two hours and a quarter, and was followed by a considerable amount of shock. The patient, however, made a complete recovery. Where there are no adhesions, removal of the stomach is not very difficult; with ordinary care hæmorrhage is not likely to occur. The effect of sur-

gical shock upon the patient is most to be feared, and should be guarded against by heat, stimulants, and quick work in operating. C. B. Brigham (Boston Med. and Surg. Jour., May 5, '98).

Complete gastrectomy in a patient 56 years of age. At the time of the report fully nine months have elapsed since the operation was performed.

The patient has gained $8\frac{3}{4}$ pounds in weight, is engaged all day long at work of various kinds in the wards of the hospital, and suffers no discomfort, excepting a sensation of pressure or tension in the epigastrium after the ingestion of an unreasonable quantity of food. Palpation through the relaxed abdominal walls fails to reveal anything suggestive of recurrence. Carl Schlatter (Lancet, Nov. 19, '98).

Study of the metabolism in Schlatter's case of total resection of the stomach. Six and a half months after the operation the patient had gained 5.4 kilogrammes in weight. The amount of nitrogen present in the stools varied within normal limits, but during the six days a complete nitrogenous balance was not obtained as occurs in health. There was a retention of from 1 gramme to 1.4 grammes of nitrogen. This retention is known to occur in convalescence from acute illnesses, etc. There was no increase in weight during the first period of observation. A month and a half later a further investigation was made with a more varied diet, and here the absence of the stomach seemed of no importance. A nitrogenous balance could now be established, showing that the regeneration of the blood was so far complete that there was no longer any need of retention of nitrogen. The retention of phosphorus was also marked. Fatty matters were satisfactorily dealt with, so that of 8.5 grammes taken only 4.64 grammes were excreted.

The absence of the hydrochloric acid in this case was without influence upon putrefactive processes in the alimentary canal.

As regards the quantity of chlorides in the urine, there was no decrease after the chief meal in this case. This confirms the current view that the diminu-

tion of the chlorides in the urine after a meal is due to the hydrochloric acid excreted by the stomach. The absolute acidity of the urine was higher in this case than in ordinary individuals. The retention of sodic chloride was striking, without there being any increase in the body-weight. There was no relationship between the excretion of chlorides and the acidity of the urine in the different periods of the day. Hoffmann (Münch. med. Woch., May 3, '98).

(See also ABDOMEN, INJURIES OF, volume i.)

Surgery of the Intestines.

Preliminary and General Measures.—

For a few days before operation careful attention should be given to the patient's general condition; especially as regards the diet, which, in some cases, should be restricted to fluids. The use of intestinal antiseptics is of some value; the intestinal tract should be thoroughly emptied, if possible, by the administration of purgatives and by the use of enemata. Washing out the stomach a short time before the operation also assists in preventing vomiting and retching.

Inasmuch as the shock following some of the severe intestinal operations is great, it is important to make use of such prophylactic measures as are likely to lessen it as much as possible. The administration of some form of alcoholic stimulant by the rectum *before* the operation and the hypodermic injection of strychnine, $\frac{1}{20}$ grain, insures their absorption, while, if we wait until after severe shock is present, we often fail to get the full effect of the drugs. The administration of an intravenous infusion of salt solution during the operation is of great value. It is, of course, of first importance to provide such efficient protection and to make use of such other measures as will keep up the body-heat.

The anæsthetic should be administered with special care, not only because

of the immediate danger, but to avoid after-vomiting and retching. In severe operations a considerable quantity of warm salt solution, left within the abdominal cavity, is an aid in combating shock.

In the after-treatment of patients who have undergone grave intestinal operations it is questionable whether morphine should be administered except to relieve the immediate pain; it often tends to aggravate the intestinal distension and paresis of the bowel which frequently follow abdominal operations. The administration of a mild saline cathartic to produce daily liquid evacuations of the bowel helps to avoid stasis and distension in severe cases. Rectal feeding does not stimulate peristalsis as much as food administered by the stomach. A supporting stimulating liquid diet is desirable during the first few days.

Enterorrhaphy.—This term is applied to the operation of suturing the intestine; it has also been used to designate the operation of joining the ends of the intestine after resection, but “intestinal anastomosis” is a better term for the latter (see below). End-to-end union is termed circular enterorrhaphy.

As suture material, fine silk is almost universally used. Catgut, although recommended by some surgeons, swells and stretches and is absorbed too quickly. The needles employed should be round, with no cutting edges, ordinary straight sewing needles being the best for intestinal work. The methods of suture which have been employed are many, but the following are in general use and suffice for all ordinary purposes.

In the *Lembert suture*, the needle is introduced through about a third to a half centimetre of the intestinal wall on one side of the wound; it is then carried across the wound and introduced in the

same way. When drawn and tied this suture brings the serous surfaces into close apposition.

Halsted has shown the importance of carrying the needle through not only the serous and muscular coats, but also into the tough submucous coat. The Lembert suture may be interrupted or continuous, when it is sometimes called Dupuytren's suture. The *Czerny-Lembert suture* is a modification of the Lembert and is really a Lembert suture in two stages: the first introduced at the edges of the wound through the mucosa, while the second suture serves to invaginate and bury the first.

In *Halsted's mattress-suture* the needle is first introduced as in the Lembert suture, then is entered again on the same side of the wound a short distance from its point of exit; it is introduced in the same manner as the Lembert stitch, but passes in the opposite direction, thus bringing both the ends of the suture out on the same side of the wound with a loop on the other side; this, when the suture is drawn down, gives a very strong hold on the tissues. The advantages claimed for this suture are that they oppose larger surfaces and more evenly, that they do not tear out as easily and constrict the tissues less than the Lembert suture, and that time is saved by lessening the knots to be tied by one-half.

Whatever method is chosen it is important that the serous surfaces be brought into apposition and that the blood-supply of the intestine be studied. The sutures should be so placed that vessels shall not be injured or compressed, in order that the circulation be as perfect as possible.

Intestinal Anastomosis.—This term is used to designate the operative establishment of communication between differ-

ent parts of the intestinal tract, whether the section of gut intervening has been removed or not. The terms *entero-enterostomy*, *ileo-ileostomy*, *ileo-colostomy*, etc., are generally used to mean the creation of intestinal anastomosis for the purpose of making a short circuit between healthy intestine above and below, the intervening portion of bowel being left because it cannot be removed or because it is not advisable or not necessary to remove it.

Entero-enterostomy may be performed for carcinoma of the intestine, stricture, agglutination by peritoneal adhesions, for the cure of artificial anus, intestinal ulceration, or other conditions in which it is desirable to put a section of intestine at rest or to avoid intestinal obstruction. It is a procedure of less gravity than resection, and is often preferable to colostomy or the establishment of an artificial anus when the condition of the patient permits. The best results from the operation are seen when it is performed for unremovable agglutination of the intestinal coils by adhesions. It may be performed by simple suturing or by the aid of various mechanical contrivances which have been devised for intestinal anastomosis.

MECHANICAL DEVICES TO AID IN INTESTINAL ANASTOMOSIS.—In addition to the method of anastomosis (uniting the intestines directly by suture), many mechanical means have been devised to aid in the rapidity and accuracy of the procedure, such as buttons, bobbins, cylinders, collapsible bulbs, anastomotic forceps, etc. The most commonly used of these is the Murphy button. In using the *Murphy button* a purse-string suture is put around each of the openings which it is desired to anastomose, beginning at the point farthest from the mesentery and taking one overstitch at the mesen-

teric junction to make certain that both layers of the peritoneum overlap. Each half of the button is introduced by forceps into the bowel, and the puckering sutures are tied closely upon the stems; the halves of the button are then locked by pushing them together. If the bowel is properly gathered around the stems, the flanges, pressed together by the spring inside, will keep up an accurate apposition of the ~~serous~~ serous surfaces of the bowel. The chief advantage of the Murphy button is the rapidity with which it can be used; the disadvantages are the possibility of imperfect union, with resulting leakage of intestinal contents and septic peritonitis and the possibility that the button may not pass from the intestine, but may give rise to ulceration or intestinal obstruction.

Murphy's button effects a very even union of the intestinal walls without pseudomembranous adhesions, and the opening shows no tendency to subsequent contraction. Czerny (Centralb. f. Chir., No. 31, '96).

The most scientific method of intestinal suture is that of Halsted, but in all methods of suture much time is consumed in the introduction of the sutures. The Murphy button is most useful in urgent cases in which operation must be most quickly performed, but the danger of the retention of the button is a real one. A. Vander Veer (N. Y. Med. Jour., Feb. 29, '96).

The *anastomotic forceps* which were devised by Laplace, and have since been modified by Downes and others, offer a means of rapidly and accurately suturing without leaving any foreign substance within the gut. The forceps resemble two pairs of hæmostatic forceps held in apposition by a clasp. The blades of each half are semicircular in shape, together forming a complete double circle, between which the portions of intestine to be united are held.

If the serous surfaces of the intestine do not tend to invert over the blades as the forceps are closed, they should be adjusted so that this will be accomplished. Continuous or interrupted sutures may be applied according to the preference of the operator. After the sutures are inserted the clamp is removed; first one-half of the forceps is carefully opened and removed, then the other is removed in the same manner. One or two sutures are sufficient to close the opening occupied by the forceps and complete the operation.

Literature of '97-'98-'99.

A new forceps for intestinal anastomosis may be described as follows: The forceps consists of two parts, which are really hæmostatic forceps, curved into a semicircle on each side. Being only held together by means of a clasp, they open as two rings. They are opened within the intestine, and serve the same purpose as Senn's rings or any other ring that has been devised, bringing serous membrane to serous membrane. Accurate suturing is the operation of the present. Therefore, if these forceps are within the gut, and sutures are applied, as they would be with the help of Senn's rings, it follows that sutures are introduced all around, except where the forceps penetrate the parts that are sutured. The suturing being done, the forceps are released by loosening the clasp, and then withdrawing the forceps out of the small opening; first one-half, then the other, when the operation is finished by a stitch or two. This forceps will serve for the operation of end-to-end anastomosis and also of lateral anastomosis. Ernest Laplace (*Annals of Surg.*, Mar., '99).

In the use of *Senn's decalcified-bone plates* or the various rings of catgut, raw-hide, etc., which have been employed, the plates are introduced into the opening which it is desired to anastomose, threaded with four needles, and the sutures are passed out through all the

coats of the bowel a little way from the edges of the intestinal openings. The intestinal surfaces are usually gently scarified to accelerate union; the ligatures in the plates are tied with the intestinal walls invaginated between them, and a reinforcing continuous suture, inserted over the edges of the rings or plates, completes the operation.

Maunsell's Method.—In this procedure two temporary sutures are employed to make preliminary approximation; these are tied and the ends left long. A longitudinal incision an inch and a half long is made in the larger segment of intestine opposite the mesentery and two inches from the divided extremity. Through this opening a pair of forceps is passed, the free ends of the sutures are caught, and the cut ends of the bowel are brought out through this opening. The two temporary sutures are held while the ends of the intestine are united by through-and-through suture. The temporary sutures are then removed, the invagination reduced, and the edges of the longitudinal incision are closed by Lembert sutures.

In Maunsell's operation, when a portion of the bowel is distended (as in strangulated hernia with gangrene of the gut) there is great difficulty in invaginating it into the contracted part. It is only suitable for cases of undistended intestine. Bowlby (*Brit. Med. Jour.*, Apr. 4, '96).

CHOICE OF METHOD.—Various positions for anastomosis have been advised by different surgeons, some preferring end-to-end, others end-to-side, and still others side-to-side junction. There is nothing to prove that lateral approximation is more successful in its immediate or remote results than end-to-end junction, and a good deal of time must be given to the closure of the free ends in case side-to-side anastomosis is performed; this time is superadded to the

methods of end-to-end junction. End-to-side junction is the natural and preferable method of joining the small bowel to the large bowel, and may be also used in case there is great contraction above the line of resection with enormous distension below. Lateral anastomosis is probably preferable to end-to-side anastomosis in most cases in which considerable difference exists in the calibre of the proximal and distal ends of the same kind of intestine. Other factors which are considered by some surgeons to be of considerable advantage in lateral anastomosis are that larger serous surfaces are opposed, giving greater likelihood of rapid and firm union and that there is less danger of stenosis at the site of anastomosis resulting from this method.

Most surgeons consider the method of suturing without leaving mechanical devices in the intestine the preferable one for the majority of cases. The use of Laplace's anastomotic forceps greatly facilitates the accurate and rapid insertion of intestinal sutures, if it seems necessary to complete the operation with the least possible loss of time because of the weakened or collapsed condition of the patient. In certain cases in which union by suture would be inconvenient or impossible, junction by means of Murphy's button is the most rapid and convenient method. When lateral anastomosis is considered desirable many surgeons prefer to accomplish it by the use of Senn's decalcified-bone plates or by some of the catgut rings, cartilage, turnip, or potato disks which have been devised as a substitute for them.

Enterotomy and Enterostomy.—"Enterotomy" is the term used to designate the operation of making an opening into the bowel through which its contents may be discharged or temporary access to its interior is gained. The name

should be retained for incision and evacuation of the intestinal contents with immediate or early closure of the opening. When the opening is kept patent for a considerable length of time "enterostomy" is the better term. These names may be applied to operations in any part of the intestinal tract, but the names colotomy and colostomy are generally used when the operation is performed on the colon.

INDICATIONS.—These operations are practically always performed for the relief of some form of acute or chronic intestinal obstruction. They may be performed in cases in which there is danger of death from great intestinal distension, vomiting, or toxin poisoning, without relieving the source of obstruction. In other cases in which the cause of obstruction has been removed, the operation may be desirable because of the great intestinal distension. It may also be performed if there is doubt as to the vitality of the intestine. In malignant disease it is often inadvisable to remove the growth, but necessary to relieve the obstruction, and in some cases the operation is desirable to prevent the irritation of feces passing over the growth, or the hæmorrhage which occasionally results from this source. As a curative measure colostomy has been performed in cases of simple ulceration of the rectum in which other means have failed. It has also been performed for the relief of excessive distension arising from atony of the walls of the intestine and for the cure of recto-vesical fistula. In case of imperforate anus the operation is indicated, provided it is impossible to open the bowel from below.

OPERATION.—The parietal incision is made over the obstruction, or as nearly so as possible. The intestinal coil is drawn through the wound and isolated

by packing. In case of urgent necessity a simple incision about an inch in length is made at the free border of the gut, after sewing it in the abdominal wound to prevent peritoneal infection. If a case is not urgent, it is desirable to wait twelve hours or more in order that firm adhesions may form. If it is desired to make permanent drainage, a rod of some smooth aseptic material may be passed through the mesentery resting on the abdominal wall, as in Maydl's operation.

Colostomy and Colotomy.—The colon has been opened both through an incision in the lumbar region and directly through the abdominal wall. Before the introduction of antiseptic technique lumbar colotomy was the preferable operation, because the posterior wall of the colon is not covered with the peritoneum and it is possible to make an opening into it without danger of infecting the peritoneal cavity. The disadvantages of *lumbar colotomy* are: it is more difficult to find the colon through the deep lumbar incision; the bowel is less efficiently drained; and fæces passing over the fresh incision tend to produce infection and suppuration. For these reasons the operation has been abandoned by nearly all surgeons, and will not be described.

Maydl's Colostomy.—The method introduced by Maydl is generally considered the simplest and best. The parietal incision may be made at any part of the abdomen which is over the colon, but, as a rule, the descending colon is opened. It is desirable to place the opening in such a position as to be convenient for the patient in the toilet of the artificial anus. About an inch behind the line of the antero-superior spine and an inch above it is a good point to begin the lower end of the incision, which should be only long

enough to permit the bowel to be drawn out. The fingers inserted through the abdominal incision usually come in contact with the colon at once, but, if it is not easily discovered, the finger may be carried along the posterior abdominal wall until the mesocolon, which will be the first structure met, is encountered. The bowel is then pulled down from above to make taut the splenic flexure, and is drawn from the wound far enough so that a stiff rod may be passed through its mesentery. Any smooth stiff antiseptic material will answer, but a glass rod with flanged ends is generally preferred. Iodoform gauze is wrapped around the ends of the rod to prevent displacement; a row of sutures is placed on each side of the prolapsed intestine, including the serous and muscular coats, stitching together the two limbs of the flexure as they lie in the abdominal wound beneath the rod. The intestine is then sutured in the parietal wound to shut off the peritoneal cavity and to prevent protrusion. The intestine may be opened immediately if the symptoms are urgent, but it is perhaps best to postpone opening it a few days until firm adhesions have formed. If the opening is to be temporary, only about a third of the periphery of the bowel is divided. If a permanent opening is desired, the bowel is cut on a level with the supporting rod. Sufficient mucous membrane should be left to form a pouting anus, at least one-half inch above the level of the abdominal wall. With such a protruding anus it is easy to collect the fæces with a cup-shaped apparatus; while, if the bowel is cut close to the abdominal wall, fæces run over the skin, and there is nothing to aid in holding the receptacle.

Intestinal Resection, or Enterectomy.

—These terms are used to designate the

removal of a section of any part of the intestine, but "colectomy" or "cæcectomy" is sometimes used to designate removal of the colon or cæcum.

INDICATIONS.—Resection of the bowel may be performed for removal of malignant or benign tumors, for gangrene, for extensive wounds and injuries, in some cases of artificial anus, irreducible intussusception, and occasionally in cases of obstruction from cicatricial adhesions or simple stricture.

Intestinal gangrene usually arises from some form of obstruction caused by internal or external strangulation. A few inches may be involved or several feet, or even the whole intestine. The line of demarkation from sound tissue may be distinct, or the gangrenous area may merge into extreme congestion without any definite limit. Whether resection should be performed or an artificial anus established will depend upon the condition of the patient, the extent of the gangrene, and the condition and location of the gangrenous area. Complete necrosis of a few inches, with healthy bowel beyond, if the patient is in good condition, may always be treated by resection. On the other hand, if an extensive area is involved, with imperfect limitation or with unhealthy bowel beyond, and if the patient is very ill, it may be best to form a temporary artificial anus. A discussion of the etiology and symptoms of gangrene from various causes will be found under the headings of **OBSTRUCTION, INTESTINAL, and THROMBOSIS OF THE MESENTERIC BLOOD-VESSELS.** The same remarks apply to the cause of obstruction.

Tumors of the Intestine.—An absolutely certain diagnosis of a tumor of the intestine is usually quite impossible at an early stage of its development. Hence, as malignant growths

within the peritoneal cavity involve important structures so rapidly and so early, an exploratory operation should be immediately resorted to in any case of intestinal disturbance in which there is rapidly developing cachexia which leads to the suspicion of a malignant growth. Resection of the growth, if possible, is always the operation of choice, but, in case it has progressed too far, entero-anastomosis or the establishment of an artificial anus may be considered.

Syphilitic tumors give rise to the same symptoms as other new growths, and the diagnosis would depend upon the history and observation of the general constitutional symptoms of syphilis.

Intestinal tuberculosis, through ulceration, inflammatory thickening, and contraction, gives rise to symptoms similar to those produced by new growths. Young persons are more commonly affected, and frequent attacks of colic are quite characteristic. The ileo-cæcal region is most commonly affected. The disease leads frequently to perforation and acute suppurative peritonitis or to the formation of a fistula. The clinical picture of tuberculosis in the ileo-cæcal region often resembles that of recurrent appendicitis or that of a tumor in this region.

Literature of '97-'98-'99.

In intestinal tuberculosis, the parts of the intestinal canal most frequently affected are in their order of frequency the last part of the ileum, the cæcum, and the first part of the ascending colon. Bacilli may reach the intestine not only in the food, but through the blood. In the first method of entrance multiple ulcerating foci result, in the second exuberant production of inflammatory tissue about tuberculous granulations in a limited part of the intestine. Women of middle age are most often affected. The pain may be diffused or localized, continuous or spasmodic; nausea and vom-

iting are frequent. Tumefaction in the painful part, which easily changes in volume, may be detected. The painful spasm is followed by diarrhœa. These symptoms are more common where there is some stenosis either from cicatrization of old ulcers or from tuberculous neoformations. The best treatment is resection of the affected parts. Margarucci (Il Policlinico, Nos. 4, 6, 8, 10, '98).

THE OPERATION OF INTESTINAL RESECTION.—The parietal incision is usually made directly over the portion of intestine about to be removed or just above it. But for resection of the small intestine the incision should never be much below the umbilicus and in most cases would preferably be above it, for greater freedom will be gained in bringing the bowel out of the incision if it is made nearer the mesenteric attachment, which is above. An exception is found, of course, in cases of gangrene from strangulated hernia in which the incision is made directly over the seat of strangulation. For excision of the cæcum an incision in the line from the antero-superior spine toward the costospinal angle will be most convenient. The first part of the incision is best made short; then after the growth is examined it may be prolonged in the direction which is likely to prove most satisfactory for its removal.

In case of grave operations an incision sufficiently extensive to give free access to the field of operation is essential. After opening the abdomen the bowel should be brought out of the incision and surrounded with gauze pads wrung out of hot, sterile, salt solution, the pads being changed as soon as they cool. The growth should be carefully examined before proceeding to remove it. In case of malignant disease resection is usually considered contra-indicated if the mesenteric glands, except in the area attached

to the bowel, are affected. König, however, has reported several very extensive operations in which the growth had involved surrounding tissues, and in which removal was not followed by recurrence for two years or more. The intestinal contents should be pressed away from the area of operation so as to leave the intestine collapsed and empty. The portion to be resected should then be isolated by means of some form of intestinal clamps. The blades of the latter are usually covered with rubber tubing to minimize the risk of injury, and they should be placed obliquely in the direction of the blood-vessels, so as not to damage them. If no clamp is available, a flat sponge may be folded around the bowel and a ligature tied over it, after perforating the mesentery. Two strips of iodoform gauze are also very efficient and always at hand. Two clamps are usually sufficient, except in operations on the colon, which it is difficult to empty. In this case a clamp is placed on each side of the line of incision and the bowel divided between. The mesentery is cut as near the bowel as permissible, instead of in a wedge-shaped piece, as has been sometimes recommended, as this involves less division of the vessels and smaller risk of gangrene. Sharp-pointed forceps are desirable in seizing blood-vessels of the intestinal walls in order to avoid unnecessary crushing. It is specially important to determine with certainty that the intestine is abundantly supplied with blood through the mesenteric vessels on each side of the resected area. If the blood-supply is doubtful it is much better to resect a larger piece of intestine until a good blood-supply is found. After the diseased area is removed the ends of the intestine may be united by simple suture according to any of the methods mentioned under intestinal

anastomosis, or by the aid of such mechanical means as may be considered desirable. Greig-Smith recommended that in case of malignant growths causing considerable obstruction, an artificial anus be first established and the bowel thoroughly unloaded, flushed, and cleansed. Then the resection may be performed at a subsequent operation.

Mortality.—The mortality after resection for gangrene will depend upon the condition of the patient and the bowel at the time of operation: it has been estimated at from 12 to 50 per cent. The mortality after operations for malignant growths has been high, very likely because of the weakened condition of the patients: it has been estimated at from 23 to 50 per cent. Probably the average mortality is not over 30 per cent. if all cases were included, and it may be hoped that, with more careful methods of diagnosis and the more frequent resort to early exploratory operation, the results will be much improved.

The writer has collected 151 cases of intestinal resection operated on since 1880, tabulated as follows:—

Hernia	42	times	with	a	mortality	of	40.5	per	cent.
Artificial anus..	44	"	"	"	"	"	43.2	"	"
Neoplasms	28	"	"	"	"	"	46.5	"	"
Obstruction	21	"	"	"	"	"	48.0	"	"
Wounds.....	16	"	"	"	"	"	37.5	"	"
Total.....	151	"	"	"	"	"	42.3	"	"

Rosenthal (Wiener med. Presse, Nos. 12, 18, 21, '92).

Series of twenty-six cases of enterectomy divided into three classes: 1. Those operated on by simple suture, 9 in number, of which 5 died, yielding a mortality of 55.5 per cent. 2. Those operated on by the Murphy button, 5 in number, of which 1 died, giving a rate of mortality of 20 per cent.; 2 had had fistulæ and a retarded convalescence, and in 1 the button had not passed while the patient was under observation. 3. Those in which a decalcified-bone support in the shape of a button or some similar contrivance was employed to support the

sutures, of which there were 12 cases with 1 death, giving a rate of mortality of 8.3 per cent. Mayo Robson (Brit. Med. Jour., Apr. 4, '96).

The result of enterectomy greatly depends on the condition of the intestine at the time of the operation. If the resected bowel had been distended the cases do badly. H. Allingham (Brit. Med. Jour., Apr. 4, '96).

Operations for Perforating Ulcers of the Intestine.—Ulceration of the intestine, which leads to perforation demanding operation, may arise as a consequence of typhoid fever; the presence of foreign bodies, particularly in the colon; or from a typical round duodenal ulcer. Tuberculosis and malignant disease may also ulcerate and give rise to perforation.

Perforation in typhoid fever is probably the most common form of intestinal perforating ulcer. It is said to occur in 6.58 per cent. of all cases; it is much more frequent among men than among women, and is comparatively rare in children. The lower portion of the ileum is most commonly affected; but the large intestine and (rarely) the appendix, jejunum, and Meckel's diverticulum may also be perforated. The perforation is usually single, and, if it results from the ulceration of a solitary follicle, it is generally small and round. Perforation of a Peyer patch is apt to be larger, with a considerable thinned area surrounding. There seems to be no definite relation between the severity of the disease and perforation. About a fourth of the number of cases occur in the course of a mild attack, and others occur during walking typhoid. The symptomatology is fully discussed under **TYPHOID FEVER**.

Indications for Operation.—Ninety-five per cent. of all patients die without operation, and, unless the condition of the patient is absolutely hopeless, an

attempt should be made in every case. Healing usually follows as well as if the patient were not suffering from the fever, and a number of patients have recovered after repeated operations. The earlier the operation can be done, after the immediate shock of the perforation, provided there has been any, the better the chances of recovery. Every hour counts, since the infection of the peritoneum rapidly becomes more diffuse and intense.

Literature of '97-'98-'99.

Surgical intervention offers practically the only hope in cases of perforation occurring in typhoid fever. There are two varieties of perforation,—appendicular and those occurring in the free bowel; and these present different courses and prognoses. Many cases show a preperforative stage in which some cases call for a laparotomy in anticipation of a complete perforation with extravasation. Leucocytosis is not an infallible sign of perforation. When the diagnosis is made, operation is indicated, whatever the condition of the patient. Even exploratory incision is more than justified. Harvey W. Cushing (Johns Hopkins Bull., Nov., '98).

Operation.—Incision is best made in the right semilunar line or through the rectus muscle. If there is any doubt as to the diagnosis, a small exploratory incision may be made under cocaine, which is enlarged if the perforation is found. The perforation should be sought first in the ileum and in the adjacent cæcum and appendix, and secondly in the sigmoid flexure and higher up in the small intestine. The perforation should be sutured without paring the edges, using Halsted's mattress-suture, and, if a second row of sutures is thought necessary, continuous suture saves time. In case of a large perforation the suture should be placed transversely to the long axis of the intestine if possible, in order to

avoid constricting the lumen of the gut. Resection of the intestine has been performed successfully in several cases in which extensive damage was found. Other perforations or points of impending perforation should be sought and sutured: deaths have followed from a second perforation or hæmorrhage in several cases in which this precaution was neglected. The cleansing of the peritoneal cavity is the subject of next greatest importance, and should be carried out with the greatest thoroughness. Whether it shall be done by flushing or wiping, or both, must be decided by the operator at the time of the operation. Drainage is necessary in most cases, but if the peritonitis is not of long standing and the abdominal cavity can be satisfactorily cleansed, the abdominal cavity may be filled with salt solution and closed. Cushing has recently advocated the use of cocaine infiltration anæsthesia instead of general anæsthesia. This is unquestionably a step in advance, for, in the weakened condition of the patient, general anæsthesia is not borne well.

The rate of mortality of this procedure has greatly improved during the past few years. The recovery-rate of all cases thus far reported is 22.72 per cent. It is more favorable under fifteen years, in the female sex, and in the fourth week of the disease. Of the series of 75 cases last reported, 54 died and 21 recovered: a recovery-rate of 28 per cent., a considerable gain over the previous rate. If physicians were aware of the good results of operation and if they called the surgeon promptly no doubt the number of successes would be even greater.

Perforating Duodenal Ulcer.—This condition is comparatively rare. The ulcer is usually found in the first part of the duodenum, more commonly on its anterior wall, and may be associated with

other disease. The symptoms are practically identical with those of perforating gastric ulcer. There is the same history of hæmatemesis, dyspepsia, and vomiting, followed by severe abdominal pain and collapse.

The treatment consists in suturing the ulcer and thoroughly cleansing the abdominal cavity, as described in the treatment of perforating gastric ulcer.

Perforating stercoral ulcer occasionally results from a foreign body, usually with some sharp projecting part, lodging in the colon. The foreign body gives rise to inflammation and the formation of adhesions, and when perforation takes place the infection is usually localized and tends to the formation of an abscess, which should be treated by incision, cleansing, and free drainage.

Thrombosis of the Mesenteric Blood-vessels.—Judging from the meagre literature on this subject, thrombosis of the mesenteric vessels is relatively infrequent, and no account of it is to be found in most of the standard textbooks. Koester has collected fifteen cases, and several have been reported since. The causes have been variously sought in ulceration of the intestines, slowing of the portal circulation, the presence of carcinoma or cirrhosis of the liver, and sclerosis of the vessels from syphilis. The onset of the disease may be sudden, during perfect health, or it may occur during recovery from some severe illness. Invariable symptoms are intense abdominal pain, extreme tenderness, and vomiting. There is often obstruction of the bowels and collapse, and, if the patient survives the shock, abdominal distension occurs; in a limited number of cases bloody diarrhœa has been observed. Death usually follows soon, possibly within a few hours, but in a case reported it was delayed for

three days. The differential diagnosis of the condition would take into consideration perforative peritonitis, acute intestinal obstruction, and possibly appendicitis. An absolute diagnosis is probably possible, but the symptoms are such as to indicate immediate operation.

Recovery has followed resection of the affected portion of the intestine.

Operations for Intestinal Obstruction.

—Inasmuch as practically all patients die unless they are operated upon, operation is indicated in every case in which there is a reasonable certainty of the diagnosis. In case of doubt one dose of purgative medicine may be administered and enemas may be freely given without harm. If there is a probability of acute intestinal obstruction, however, not more than one full dose of purgative should be administered, for such remedies may do decided harm. If the symptoms persist and the diagnosis is still doubtful, prompt exploratory operation is indicated. (See OBSTRUCTION, INTESTINAL, in volume v.)

OPERATION.—The amount of operative intervention will depend upon the condition of the patient. Very commonly the surgeon is called in late and the patient is in a much weakened and collapsed condition; in such cases the use of a general anæsthetic is full of danger, for vomiting is almost certain to occur, and the vomited fluids are likely to be drawn into the lung, causing death by suffocation or by subsequent broncho-pneumonia. In such urgent cases the operation is best performed with local anæsthesia. The incision should be made in the median line below the umbilicus, unless there is considerable certainty as to the location of the obstruction, in which case the incision may be made over the site of the obstruction. Only a short time should

be devoted to exploration; if the cause of obstruction is not found an artificial anus should be made, which will put the patient for the time out of danger, and the operation may be completed at a later date. The first object is to save the patient's life. In seeking the site of obstruction it should be remembered that the most dilated coils are above the obstruction and will rise nearest to the surface, usually near the umbilicus, and by following the most distended and congested portion of the intestine the stricture will generally be found. If the obstruction is not found in this manner, the hand may be inserted. If the cæcum is first examined and found distended, the cause of obstruction is probably located lower down in the colon; if not distended, the seat of obstruction is sought in the small bowel. The measures taken for relief of constriction will depend upon its cause and upon the condition of the bowel. A volvulus should be untwisted, the mesentery shortened, and intussusception reduced by drawing the invaginated portion out. The treatment of intussusception by inverting the patient and by injecting large amounts of gas or fluid in the colon has not given very satisfactory results, and, unless immediately successful, operation should not be delayed.

If there is excessive distension of the bowel it will be necessary to relieve it after removing the cause of obstruction. This may be done by one or more incisions, carefully protecting the abdominal cavity by packing gauze about the opening, which should be closed at once by Lembert sutures. In some cases in which the intestine is found gangrenous resection may be necessary. Very excessive distension would sometimes call for the formation of a tempo-

rary artificial anus. In the after-treatment opium should be avoided, as it tends to paralyze the bowels, causing distension and checking all the secretions. If gas or fluid is not passed and the distension does not diminish, the abdomen should be reopened and enterotomy performed. Rectal feeding may be necessary for several days until food is well borne by the mouth.

In chronic intestinal obstruction the treatment will depend on the number and severity of the attacks. If the general health of the patient is suffering, operation is indicated.

In chronic obstruction due to stricture or tumors resection may be possible; but, if malignant growth has progressed too far to admit of this, enterostomy or colostomy is indicated. In the case of foreign bodies, such as gall-stones, it is sometimes possible to break them up, by pressure or by needling, or to pass them along after the abdomen is opened without opening the intestine. As a rule, however, it is best to extract the body through the incision. (See also APPENDICITIS and ABDOMEN, INJURIES OF, volume i.)

W. W. KEEN,
M. B. TINKER,
Philadelphia.

STOMACH, DISEASES OF.

Acute Gastritis.

Synonym.—Acute gastric catarrh.

Symptoms.—The chief symptoms of acute gastric catarrh are loss of appetite, a heavily-coated tongue, fœtid breath, perhaps increased salivation, nausea, and usually vomiting, which last, if persistent, is associated with considerable thirst. There may be constipation or diarrhœa; the fæces are of an offensive odor. In mild cases fever is absent; in the more severe forms, present. Headache and

lassitude are usual, and herpes may appear on the lips in the course of the malady. The abdomen is usually distended with gas and the epigastrium somewhat tender to pressure. Acute pain is often present in the more severe forms. The duration of an attack is variable, but is rarely over a week. The urine is febrile, high colored, scanty, and deposits large amounts of urates. The vomit consists at first of partly-digested food, and subsequently of bile-stained mucus and of bile. An examination of the vomit usually shows absence of free HCl, with diminution in the amount of pepsin and of the labferment. There are apt to be present, as the result of stagnation of food in the stomach and diminution or absence of secretion of HCl, various organic acids, such as lactic, butyric, and especially acetic acid if the attack has been brought on by alcoholic excess.

Diagnosis.—When the attack is of short duration and when fever is absent, there can be no difficulty in diagnosis. The separation of this affection in its more severe forms from typhoid fever, especially abortive typhoid, usually presents the only difficulty. But the absence of preceding epistaxis, of prodromal symptoms of typhoid, and the characteristic rise of temperature; of the enlarged spleen; and, later, of the typical spots; the characteristic diarrhoea and appearance of the stools, and the absence of the Widal reaction (a point of not extreme value, since it must be determined early in the disease) severally or jointly enable a separation to be made. Herpes labialis is against typhoid fever. Certain cases of acute gastritis in which the various dietetic errors before mentioned may seem to be excluded have onset in a manner to suggest an acute infection. The writer has seen several instances. With

severe headache and delirium at the onset—rare, though, in any stage of the disease—meningitis is easily thought of, and is at first difficult to exclude.

Etiology.—As remarked elsewhere by the writer, this affection is dependent upon somewhat varied etiological factors. Among these are: a too-free indulgence in the pleasures of the table; the ingestion of food or drink of irritating quality or of excessive quantity. The former includes very hot, cold, or indigestible food; spices, undiluted spirituous beverages, or the too-free indulgence in those partly diluted, and certain drugs; all of these originate acute gastritis through their local irritant action on the mucous membrane. Excessive indulgence in alcohol is a very common cause of acute gastritis.

The gastritis may be of an infectious origin due to the action of micro-organisms or their toxins. In some of the recent epidemics of grippe the writer has encountered cases in which the stomach alone bore the brunt.

Pathology.—In simple acute gastritis there occurs redness and swelling of the mucosa and of the submucosa, and in the more severe forms small hæmorrhages or even superficial erosions may be noted. There is much diminution in the secretion of hydrochloric acid and in the pepsin and labferments, and mucus in considerable quantity appears as the result of mucoid degeneration of the columnar epithelial cells. Histologically there is noted a granular swelling of the glandular epithelium of the peptic- and acid-secreting cells and an infiltration of leucocytes into the surrounding intertubular tissue. The functions of the stomach—the secretory, the motor, and the absorptive—are all affected.

Treatment.—The chief therapeutic indications are: removal of the exciting

cause; checking the gastric irritability, and giving rest to the diseased organ. The first is met by the evacuation of the stomach-contents, which usually is spontaneous. Should emesis not occur and if occurring not be efficient and the presence of undigested food in the stomach be suspected, vomiting should be induced, as by the free ingestion of warm water containing sodium bicarbonate. Vomiting not being excited in this manner, or, after, emesis continuance of the local symptoms indicate that the stomach has not been efficiently emptied, a resort should be had to the stomach-tube or to an unirritating emetic. The stomach-tube is preferable in that by it after the removal of the stagnating ingesta, a thorough cleansing of the mucous membrane can be accomplished. Alternate hot (105° F.) and cool (65° F.) water is used, to which is added sodium bicarbonate at first and subsequently an antiseptic, such as a weak permanganate solution, boric acid, betanaphthol, or thymol. Should an emetic seem more expedient than the use of the tube, ipecac (1 to 5 grains), or, preferably, apomorphine hydrochlorate ($\frac{1}{12}$ to $\frac{1}{3}$ grain by the mouth or $\frac{1}{16}$ to $\frac{1}{4}$ hypodermically) may be administered. Subsequent to the complete evacuation of the stomach-contents a laxative, preferably calomel, is usually indicated. The observations of Beaumont on St. Martin indicate that calomel has an influence little short of specific on the mucous membrane inflamed through dietetic errors or alcoholic excess. Its influence seems to be both local, due to its sedative and antiseptic effect, and systemic through its chologogic action. Calomel is administered in a full single dose of from 2 to 5, or, in exceptional cases, 10 grains; given dry upon the tongue or preferably in trituration with milk-sugar or sodium

bicarbonate. If vomiting occurs soon after its administration the dose must be repeated. A saline laxative, such as effervescing magnesia citrate, is administered in from six to eight hours afterward, provided a full action of the bowel in the meanwhile has not been obtained.

Following evacuation of the stomach-contents, gastric irritability, should it continue, is best allayed by the total withdrawal of all food for a limited time; confining the patient to bed; the application of counter-irritants in the form of sinapisms or a small blister to the epigastrium, and the administration of a few doses at hourly or half-hourly intervals of: dilute hydrocyanic acid, 1 to 2 drops; bismuth subnitrate, 5 to 10 grains; in diluted mint-water. Or there may be used a powder containing cocaine hydrochlorate, $\frac{1}{12}$ to $\frac{1}{8}$ grain; codeine phosphate, $\frac{1}{8}$ grain; cerium oxalate, 2 to 5 grains. Cerium oxalate alone, in doses of 5 grains given dry upon the tongue, at intervals of one-half to one hour, is often singularly efficient in checking vomiting after the contents of the stomach have been evacuated. Carbolic acid, $\frac{1}{4}$ grain, in combination with a small dose of bismuth, exhibited in dilute mint-water, is useful. Strontium bromide in cases in which a nervous element exists is often of value. It or another bromide salt, in combination with chloral, may be administered by the rectum. Morphine may have to be resorted to hypodermically, if the nausea and vomiting continue despite the use of the above remedies after the stomach has been completely evacuated. The ingestion of bits of ice or of small quantities of iced carbonated water allays thirst and tends also to check the nausea and vomiting. Washing out the stomach with hot and cold water alternated will often prove efficient.

For the control of gastric pain codeine

internally, combined with dilute hydrocyanic acid, and with cocaine, should be used. Externally, turpentine stupes, or spongipilin first immersed in hot water and then rinsed, is indicated. For further details see the treatment of gastric pain in ulcer.

The nourishment should be of the lightest character while the acute symptoms continue. If the patient is well nourished and the attack has arisen from dietetic discretion, as is usual, for a day or two almost complete abstinence from food is indicated. During this time peptonized milk or milk diluted with a carbonated alkaline water may be given in small quantities at moderately frequent intervals, or a preparation of koumyss may be tried. In other particulars the diet suggested in the treatment of gastric ulcer is applicable here. (For a more detailed discussion of the therapy of acute gastric catarrh see the writer's contribution in the "System of Practical Therapeutics," vol. ii; Lea Brothers, publishers.)

Phlegmonous, or Purulent, Gastritis.

This rare disease may occur idiosynthetically or as a complication of another disease, such as typhoid fever, small-pox, puerperal fever, pyæmia, etc. Two forms are described: a diffuse purulent infiltration of the stomach-wall and a circumscribed, localized abscess, as a result of which last a purulent tumor of some size develops which subsequently opens into the stomach, externally, or into the peritoneal cavity.

Symptoms.—The symptoms are those of a septic process plus those of the local inflammation, which last may be altogether masked by the height of the systemic disturbance. There is high fever resembling in its character that of a severe septic infection. It is associated with great prostration of strength, delirium, and, if a fatal issue is imminent,

coma; jaundice may occur. There is nearly always localized epigastric pain and dry, heavily-furred tongue; vomiting, meteorism, and diarrhoea are usual. Death results in most cases in from a few days to two weeks. Recovery is unlikely unless the abscess perforates externally or into the stomach.

Diagnosis.—The separation of phlegmonous gastritis from perigastritis, subsequent to perforation of a latent gastric ulcer, acute pancreatitis, hepatic abscess, and acute poisoning is difficult, and most often impossible.

Treatment.—Little can usually be done even though the affection be presumed to be recognized. Endeavor should be made to control the vomiting and the gastric pain by the use of remedies suggested in the treatment of simple acute gastritis and in the treatment of gastric ulcer. Morphine is here more often indicated.

Toxic Gastritis.

Symptoms.—The symptoms succeeding the ingestion of a corrosive poison vary, of course, with the amount and variety of the poison taken. These, however, usually are: intense pain in the mouth, throat, œsophagus, and the stomach. There is profuse salivation, and urgent and uncontrollable vomiting. The vomited matter is usually blood-stained, and may contain bits of the destroyed mucous membrane. There is great thirst, and prostration and collapse may early occur.

Albumin and blood appear in the urine, and, microscopically, blood-cells, renal epithelium, and epithelial and blood-casts are apt to abound.

If the patient survives, the sloughs that have formed in the stomach are succeeded, after separation, by ulcers, which, in process of cicatrization, may lead to stricture of the œsophagus, cardia, pylo-

rus, or to hour-glass contraction of the stomach. A generalized atrophy of the mucous membrane may result in cases in which the poison taken in a more dilute form exerts a necrotic effect upon the glandular epithelium.

Diagnosis.—The diagnosis is commonly readily made. The corrosive effect of the poison evident in the mouth and throat, the character of the vomit (and later its chemical examination), the characteristic symptoms evident, and perhaps the history of the ingestion of a toxic substance, all tend to render the diagnosis easy.

Etiology.—This disease is originated by the ingestion of substances which act by local destruction of tissue,—poisons,—such as oxalic acid, the mineral acids, caustic alkalies, arsenous acid, antimony, phosphorus, carbolic acid, ammonia, and the like.

The mucous membrane and the submucous tissue of the stomach is usually extensively destroyed by the corrosive poison; or, with such non-corroding poisons such as phosphorus and arsenic, its glandular structure is the seat of an acute degeneration.

Treatment.—The treatment consists in the neutralization of the irritant poison; for instance, for acids, the administration of a mixture of magnesia, lime, and water may be used; this forms with all the acids, except oxalic, soluble, harmless salts. If magnesia is not at hand a solution of sodium carbonate or bicarbonate, chalk, or soap should be administered. For neutralization of the caustic alkalies there should be employed dilute vinegar, lemon-juice, diluted acetic acid, or tartaric acid. Carbolic acid calls for soluble sulphates or calcium hydrate or the saccharate. Poisoning by phosphorus demands the use of copper sulphate or of the old, unrectified oil of

turpentine. The ingestion of arsenic calls for the hydrated iron sesquioxide or magnesium sulphate.

Mucilaginous substances and oils are administered as demulcents after neutralization and evacuation of the alkalies and mineral acids. In all cases of poisoning not due to corrosives or to the mineral acids the stomach should be emptied and thoroughly washed out by means of the soft stomach-tube.

Chronic Gastritis.

Synonym.—Chronic gastric catarrh.

Definition.—A condition characterized by chronic disturbance of digestion originated and maintained by definite anatomical alterations in the stomach-wall.

Varieties.—Clinically it seems proper to distinguish four forms of chronic gastritis, all of which, finally, if unchecked, tend to terminate in hypertrophic or atrophic gastritis.

(a) Acid gastritis; (b) subacid gastritis; (c) mucous gastritis; (d) atrophic gastritis.

The occurrence of *acid gastritis*, as first described by Boas, is, curiously, still disputed; but, of its existence and frequency apart from the neurosis hyperchlorhydria, the writer sees almost daily examples. In this there occurs either a normal or frequently a marked heightening in the secretion of HCl, but, in the writer's experience, associated also with the presence of organic acids of fermentation out of proportion to that encountered in simple hyperchlorhydria. Here, as in many cases of hyperchlorhydria, there exists as a result of an hypertrophy and proliferation of the gland secreting elements, an actual increase of the oxyntic, or HCl-secreting, cells.

Subacid gastritis is that form in which the secretion of HCl is diminished in slight or extreme degree and there is coincident, but far less extensive, diminu-

tion in secretion of the ferments. Subacid gastritis may terminate in so-called (*d*) *atrophic gastritis*, in which, with more or less complete atrophy of the glandular elements, even traces of HCl are no longer apparent, and the ferments, though rarely disappearing entirely, are recognizable with difficulty only in their inactive or proenzyme stage. In this condition there finally occurs complete disappearance of the secreting structure, with absence, even, of traces of the proenzymes.

Mucous gastritis is characterized by the almost habitual appearance in the wash-water or in the vomit of a considerable quantity of mucus.

Symptoms. — Chronic gastritis is of very insidious onset, and is attended by a train of symptoms more or less striking and serious, depending upon the degree of its existence and the variety. These symptoms are those of disturbed digestion, such as loss of, or variable, appetite, and perhaps actual distaste for food other than that highly seasoned; bad taste; an habitual coated tongue in the morning and of its root as well through the day; at times nausea and vomiting, the last occurring especially in the chronic gastritis of alcoholics, when it is usual in the morning on arising and then consists of glairy mucus; gaseous eructations; pyrosis; "heart-burn," common in acid gastritis; fullness and heaviness in the epigastrium after meals—less usual in acid gastritis.

The vomited matter rejected by day, after food has been taken, as with the stomach-contents extracted through the tube, will show the presence or absence of HCl and the ferments according to the length of stay of food in the stomach and the variety and stage of the gastritis present, whether acid, subacid, or atrophic. Mucus is apt to be present in con-

siderable quantity, as are yeast-cells and bacteria which have made a habitat of the mucous membrane of the diseased stomach; leucocytes in abundance and erythrocytes in small amount may be recognized, especially in the wash-water of the fasting stomach. Lactic acid is unusual, save in traces derived from the food ingested, except with coincident dilatation and a high degree of stagnation. With similar dilatation and stagnation, but with presence of free HCl, *sarcinae* are encountered. These are especially noted in the lifted contents or in the vomit in the morning before food has yet been taken.

Gastric pain sometimes occurs in all forms, but is most usual in the gastritis of excessive drinkers. There is then present diffuse soreness, amounting, perhaps, to actual pain, occurring commonly soon after meals, but which may be present on the empty stomach. In amount and character the pain is occasionally of such severity as to originate a suspicion of cancer or of ulcer. The pain may be of the nature of gastralgia, paroxysmal and variable in occurrence, and may then be associated with diffuse or localized tenderness on pressure.

The bowels are apt to be more or less habitually constipated and the faeces malodorous.

Through the long-continued imperfect digestion the bodily nutrition suffers and loss in weight and a moderate anæmia or chloranæmia occurs. In atrophy of the gastric tubules with marked impairment of the motor power, or with preserved motility and presumed failure of pancreatic secretory activity, due to disease of that organ, anæmia is common and may assume the characteristics of the pernicious (so-called idiopathic) grade.

The urine in mild chronic gastritis shows no special characteristics. In that

in which the nutrition suffers the urine is apt to be diminished in amount, and thus of a relative high specific gravity, but actually with considerable diminution in amount of total urinary solids, notably of urea. The phosphates are increased and the acidity diminished.

The motor function of the stomach, especially in the early stages of chronic gastritis, is in some cases increased. Commonly in the later stages it is impaired more or less markedly, although the gastric capacity may not be increased, the diminished gastric peristole being due to coincident atrophy of the muscularis as a result of connective-tissue increase and to the lowered nutrition present.

Headache is common; attacks of mild or pronounced vertigo sometimes occur, and marked mental depression is usual. Actual melancholia may develop.

Although chronic gastritis may occur at any age, it is most usual toward middle life and is more common in men.

The course of chronic gastritis is variable. If encountered early and properly treated recovery is usual. Later, with marked anatomical changes in the stomach, as evinced by persistent diminution in secretory or motor activity, the prognosis is grave, although, even in extreme atony of the tubules with restored motor power and preserved pancreatic activity, the patient may, to all appearances, regain and maintain health for a long period. The writer has now had several cases of this sort under observation for a few years in which, with total secretory loss, originated by a chronic gastritis, the general health is well maintained.

Diagnosis.—A diagnosis of chronic gastritis not secondary to another gastric disease—such as carcinoma, dilatation, or to an obstructive disease of the liver, or the heart, of the lungs, or to disease of other organs, such as the kidneys—must

only be reached by the most searching exclusive process. Otherwise it is but symptomatic, and the treatment is practically valueless. A separation of the different varieties of gastritis, the acid, subacid, atrophic, and the mucous,—the first two of which may have associated with it the last,—the recognition of motor increase or impairment, can be readily made as a result of a sufficient number of examinations by means of the stomach-tube, and the application of the most approved clinical and laboratory methods, none of which, of actual value, are difficult to employ or to comprehend after a little experience with them. Unfortunately space is not permitted here for their detail.

In the differential diagnosis of chronic gastritis it is especially important to exclude the simple gastric neuroses and carcinoma and ulcer of the stomach. Attention to the symptomatology of these affections and patient study of the case under view will commonly enable a separation to be made. In excluding a neurosis, especially that form characterized by hyperchlorhydria or by anacidity, it is especially important to consider the preceding history and the accompanying objective and subjective symptoms; to make examinations of the stomach-contents in order to ascertain the condition of the secretory and motor functions on a number of occasions, and to repeat these at definite intervals; to recall that in these gastric neuroses there is not infrequently a total reversal of what has seemed the usual condition, marked atony being succeeded by hypermotility, and subacidity or anacidity, or hyperchlorhydria by its antithesis. The habitual presence of considerable mucus in the wash-water; of some amount of the organic acids, such as butyric or acetic; of, microscopically, leucocytes

and of bacteria, and of exfoliated epithelium, of course, favors gastritis.

Any comprehensive survey of the differential diagnosis is not permitted here. It is especially important to separate carcinoma and ulcer of the stomach from chronic gastritis. In carcinoma, more especially of the pylorus, with the accompanying stagnation and decomposition of food in the stomach, there are absence of free HCl and the presence of considerable amounts of lactic acid; vomiting is usual, the vomited matter showing indications of bright-red or, more likely, altered blood; there is more or less characteristic pain; and emaciation is more rapid than in chronic gastritis; often the presence of a tumor may be detected.

In ulcer there is localized and usually intense gastric pain and tenderness, the pain often extending through to the back. Gastric hæmorrhage, causing, although not always, hæmatemesis and the presence of blood in the stools, is more or less usual, although not invariable as concerns detection.

Etiology.—Chronic gastritis may be either primary or secondary to a pre-existing disease of the stomach, such as carcinoma, dilatation, simple atony, ulcer, or to disease of the teeth, of the mouth, of the throat, or as a result of chronic venous engorgement of the stomach dependent upon obstructive disease of the liver, the heart, or the lungs; or to certain constitutional states, such as the diseases of the blood, tuberculosis, diabetes, and to chronic nephritis.

The usual causes of primary gastritis are long-continued dietetic indiscretions; eating food improper in quality or quantity; meals at irregular or at too short intervals; habitual overeating, especially when fatigued; drinking large quantities of fluids with the meals, especially if iced or at a very high temperature;

imperfect mastication and insalivation of food through carelessness or through absence of teeth (this last is a common and often overlooked cause). The abuse of alcohol is a very common cause of gastritis.

Pathology.—The essential pathological process in chronic gastritis is a parenchymatous and interstitial inflammation of the secretory glandular structure and finally of the deeper layers of the gastric wall, especially in the pyloric region, which inflammatory process leads to interference with the various functions of the stomach, and to degeneration, wasting, or hypertrophy of that organ. Anatomically, two main forms of chronic gastritis are described: the hypertrophic and the atrophic. The former is largely the result of considerable connective-tissue increase, tending to give rise to much thickening of the stomach-wall, to mammillation of the mucosa and partial or complete destruction of the glandular elements. The atrophic form is that in which atrophy of the mucous membrane and of the muscularis, with coincident atrophy of the glandular elements, leads to thinning of the gastric wall and subsequently to either diminution in the size of the stomach or to its dilatation.

Treatment.—Effort should be first directed to ascertain if the gastritis is secondary to disease of another organ, such, for instance, as to obstructive disease of the heart, lungs, or of the liver. Ailments thus originating chronic gastritis must receive careful attention before the local gastric condition can be improved; otherwise remedial measures directed solely to the stomach will be inoperable. Drugs, such as strophanthus, digitalis, and strychnine for the valvular disease or the emphysema, free purgation to unload the portal circle, are frequently necessary in gastritis due to heart disease

as from that arising from disease of the liver. The existence of wasting disease and all sources of malnutrition,—such as tuberculosis pulmonum, chronic malaria, nephritis,—which predispose to chronic gastritis, must be inquired into.

If not directly or indirectly secondary to disease in another organ, the condition of the mouth should be ascertained; an examination as to carious teeth, or absence of molars (both not infrequently and usually unsuspected causes of gastric disturbances), as to the patient's dietetic and bibulous habits; these and similar underlying conditions, such as any habit of the patient prejudicial to health, must be thought of in order to obtain the best results from treatment. Systematic exercise in the fresh air, regularity in eating, with sufficient intervals between meals; thorough mastication and salivation of food; attention to the condition of the bowels and of the skin: in short, all that depends to general hygiene demands as much attention as the medicinal treatment itself.

In all cases of gastritis in which the functions of the stomach are seriously affected, especially with the existence of subacidity and the accumulation of a considerable amount of mucus and a tendency to marked stagnation of the ingesta, lavage is of the utmost utility, not only as a cleanser of the mucous membrane, but properly employed as a stimulant to the secretory and motor functions. The tube and the accompanying apparatus such as is made according to the writer's direction, by Tiemann, of New York, should be employed in order to obtain the douche effect so important in the treatment of atony and of subacidity. The tube should be used once daily at first, preferably on rising in the morning, a half hour or more before breakfast; if dur-

ing the day, at the time but little of the preceding meal remains in the stomach. The hot water is preferably medicated with sodium bicarbonate and chloride in the proportion of 2 teaspoonfuls of each to the funnellful (750 cubic centimetres); but with the existence of large amounts of mucus a larger quantity of soda is essential. Hot (105°) and cool (60°) water are alternately employed. The fluid is passed into the stomach with the intragastric end just engaging the cardia (approximately seventeen inches), and removed with it further introduced to the most dependent part of the stomach, the distance varying in different individuals, but, approximately in the undilated and unprolapsed stomach, twenty-one inches. The tube is again withdrawn to the former mentioned distance on the introduction of each funnellful, and again re-passed for its removal. The hard rubber funnel employed has a capacity of about 750 cubic centimetres. This or a less amount is entered at one time. The writer employed a weak solution of quassia or calumba in the cool water in cases of subacidity and when little mucus exists, with sodium bicarbonate contained in but the first funnellful of water; or sodium bicarbonate is dispensed with and hydrochloric acid in one-half or less decinormal strength is added to the bitter infusion. This line of treatment almost invariably exerts a marked symptomatic improvement. If the stomach is very foul, as in carcinoma and rarely in simple chronic gastritis, antiseptics such as saturated solution of betanaphthol, or weak borax, or sodium sulphite or permanganate solution are employed after the first washing with sodium bicarbonate. From 3 to 6 funnellfuls are required to be separately entered and removed with each lavage. The process must not be prolonged if it is debili-

tating to the patient. Silver-nitrate solution, employed in amount and procedure such as the writer directs in the treatment of ulcer, and alumnol are most useful in chronic gastritis, especially in the hyperacid and in the mucous varieties. If for any reason lavage seems impracticable, natural or artificial Carlsbad salts (sodium bicarbonate, 36; sodium chloride, 18; sodium sulphate, 42; potassium sulphate, 3.25; the sodium sulphate is added only if a mild laxative action is desired) may be employed, taken in hot solution; or, in mild cases in which a saline water seems indicated as a secretory stimulant, German Kissengen (Rakoczy) or Wiesbaden (Kochbrunner) may be used, as is recommended by Boas. These waters consist essentially of a weak solution of common salt and of alkaline carbonates, especially that of sodium, and may be replaced by the addition of these salts to ordinary water, the solution preferably being ingested rather warm. The local effects of small doses of sodium bicarbonate and sodium chloride are stimulating to the secretion of HCl, and the sodium chloride, after absorption into the blood, while unquestionably contributing to the formation of the gastric acid, is also of utility, both locally and systemically, to pepsin-formation and to the transformation of inactive pepsinogen into the active enzyme.

The frequent use of saline laxative waters, especially those containing sodium chloride and bicarbonate, besides their laxative salts (preferably sodium sulphate), are of distinct service in synergizing the effects of lavage in cleansing the stomach of mucus, promoting a healthy condition of its walls, and influencing its functions generally for good, even when lavage alone promotes regular alvine evacuations through its

stimulating effect on the gastric and the intestinal peristole.

Silver nitrate, save employed as a wash on the empty clean stomach, the writer does not regard as of utility. Bismuth subnitrate and subgallate and zinc oxide are of no special service in the treatment of chronic gastritis. In the form characterized by hyperchlorhydria bismuth is of value, as it is when gastric hyperæsthesia and actual pain are prominent symptoms. It should be given on the empty stomach in doses of 5 to 30 grains, and codeine, hydrocyanic acid, cocaine, hyoscyamus, or belladonna may be combined with it, as in the treatment of the pain of ulcer. The best result from its use is following lavage. In cases of superacidity an alkali or a combination of alkalis, such as is recommended in ulcer, is called for to be administered at a period in gastric digestion when peptonization has advanced and an amount of free HCl-over that required for the completion of digestion becomes evident. The dose should be based upon the degree of acidity, ascertained by examination of the stomach-contents, after not only the bread trial-meal, but one of mixed food, it being recalled that the degree of discomfort originating from the hyperacidity may, with heightened gastric sensibility, be out of proportion to the actual extent of acidity. Here even more than in simple hyperchlorhydria too full a dose of antacid must not be habitually given soon after a meal.

In most cases of subacidity there is no remedy of more service alone or in combination with a simple bitter than HCl. Its uses in chronic gastritis are many; in acting not alone as a digestant, but also in stimulating the formation of pepsin and perhaps its own secretion; in assisting in the transformation of the inactive proenzymes existing in the gland-cells

into the active ferments; and in inhibiting fermentative processes which constantly occur in this disease when stagnation of food is usual. A combination of pepsin with it is unnecessary, since, when HCl can be of any utility as a digestant, the pepsin already exists in sufficient quantity in the gastric tubules, needing only the presence of HCl to bring it into activity. The pepsin-secreting cells are so much more widely distributed in the stomach and in so much greater number that it is almost invariable in cases in which HCl is absent other than those of complete gastric atrophy that pepsin can still be readily obtained from the stomach in quantities sufficient to act as a digestant by means of the use of HCl. The question of pepsin-and-HCl administration in diseases of the stomach has been before entered into in detail in a paper by the writer (*Ther. Gaz.*, Feb. 15, '93), a reprint of which will be sent on application.

As a secretory stimulant, HCl may be given in small doses (10 to 15 minims of the dilute acid) shortly before meals, or preferably in larger post-prandial ones, that advantage may also be taken of its ability to assist digestion. The writer commonly gives $\frac{1}{2}$ drachm to 2 drachms largely diluted with water in divided doses at intervals of ten to twenty minutes, the initial dose being taken a half-hour after meals; or the acid may be taken through a small stomach-tube in a single dose of from 1 to 2 drachms. This last is the writer's favorite mode of administering the acid in cases of neurotic subacidity accustomed to the tube. In cases in which HCl is practically not secreted through atrophy of the gastric tubules its administration can be of no utility.

The bitter tonics—such as *nux vomica* (or *strychnine*), *quassia*, *calumba*, con-

durango, and *gentian*—synergize the action of HCl as secretory stimulants, and are of value (although less here than in functional [nervous] subacidity and atony) in imparting tone to the weakened muscularis. Their utility is more marked when administered before than after meals.

Intragastric electricity, but especially faradism, the writer regards (in ten years' experience with it) of value in cases of subacidity and loss of gastric motor tone.

TREATMENT OF CONSTIPATION.—Apart from the use of an occasional laxative, it should be endeavored to overcome constipation by attention to the diet and by mechanical measures, such as exercise and massage. An occasional dose of calomel or of blue mass is necessary in gastric catarrh, especially in that secondary to chronic heart or to liver disease, in which engorgement of the portal viscera exist. In the last salines are of great value. In simple gastric catarrh salines, such as sodium sulphate and phosphate in moderate doses before breakfast, not continued for a long period, are of value, but are less generally required than such vegetable aperients as *cascara*, *aloes* (in the form of *aloin*), *rhubarb*, and occasionally *podophyllum*. The writer uses largely the following combination in capsule:—

R *Aloin*, $\frac{1}{8}$ to $\frac{1}{4}$ grain.

Extract of *cascara sagrada*, 1 to 2 grains.

Extract of *hyoscyamus*, $\frac{1}{8}$ to $\frac{1}{4}$ grain.

Extract of *nux vomica*, $\frac{1}{4}$ grain.

Oil of *cajuput*, 1 minim.—*M.*

Resin of *podophyllum* ($\frac{1}{8}$ to $\frac{1}{4}$ grain), *euonymin* (1 to 2 grains), and *leptandrin* (1 to 2 grains) are added when it is desired to increase the biliary

secretion, other than with calomel, and favor its flow into the bowel.

But a reliable preparation of cascara alone, the dose of which can be better regulated than that of a drug in pill form, is probably the best mild laxative; although the form of laxative should be frequently varied, as the effect diminishes with constant use. The object to be obtained, of course, is regulation of the bowels, and not mere purgation. An occasional enema of olive-oil taken on retiring (4 to 8 ounces), especially if passed into the sigmoid and retained over night, is often of signal value in at least temporarily overcoming constipation.

The previous and present dietetic habits of the patient must be inquired into carefully, and rules laid down as to the future. A specially-prepared diet-list is of great value, but this must be based on a careful study of the condition of the stomach, the state of the secretory and the motor power; the extent fermentation occurs in the stomach, and the readiness with which the carbohydrates are digested. The condition of the mouth and of the teeth must also receive attention, in order that thorough mastication and insalivation necessary for proper digestion be accomplished. The diet, while of a sort to maintain bodily nutrition, must be one which will not overtax the stomach. A milk diet, unless to meet a special indication, is not advisable. Much food must not be taken at one time, and, if motility be much impaired, a point to be carefully ascertained, a sufficient interval must elapse between meals to permit the stomach to empty itself. When solid food is taken albuminoids are preferable to carbohydrates, and sweets are usually better avoided, especially in acid and in mucous gastritis.

Eggs, soft boiled (preferably coddled)

or lightly poached, their albumin becoming opaque, though semifluid; short-fibered, tender meat, free from fat; boiled mutton; or roasted, tender beef; broiled tenderloin steak thoroughly divided; or Hamburger steak may be permitted provided they are digested without discomfort, although with the assistance of HCl, or with an active preparation of papain. The use of the latter the writer favors and has for years largely employed in cases in which other effects from HCl than the digestive were not especially demanded. Papain is administered in doses of 5 grains in combination with taka-diastase when carbohydrates are also taken and their digestion in the stomach is impaired. With this, 1 to 2 grains of powdered rhubarb and $\frac{1}{10}$ to $\frac{1}{5}$ grain of powdered ipecac are of utility, the dose administered in the form of a wafer. Certain of the wheat breakfast-foods that are of acknowledged ease of digestion are usually permissible, eaten with the addition of salt and a little cream. Oatmeal in any form is objectionable. Home-made light bread, forty-eight hours old, is allowed. Potatoes; pease and beans in the form of *purées*, first passed through a sieve, may be allowed; as may be fresh young pease, well mashed by the fork, young carrots and asparagus, and, save in acid gastritis, rice, if well cooked, and a small part of a very mealy boiled or baked potato. Fried food is to be avoided. Fats, except butter and cream in very moderate quantity, are not permissible. Fats mechanically delay digestion by impeding penetration of the saliva and subsequently of the gastric juice, forming, as they do, an almost insoluble coating about the otherwise soluble ingesta. Fatty acids tend to develop from them in cases in which atony is present, and enhance the unhealthy condition of the mucous mem-

brane already present. Excepting salt, condiments are to be avoided. Broths or soups made of meat-extracts must be partaken of sparingly, if at all, at the time solid food is eaten, because of their decided neutralizing effect on the secretion of HCl in the stomach by virtue of their contained salts. In small quantity at the start of a meal sapid broths are useful as peptogens, and, when fortified by a raw egg (poached by contact in the cup with the boiling broth), a light meal may be so made. Tea and coffee are better avoided. If taken they must be drunk weak and without cream or sugar. Hot milk is permissible with coffee, which should be taken after rather than with the meal. If fruit acid is craved, orange-juice, especially in the morning; sweet grapes, the seeds and skin rejected, are the best. But the pulp of juicy peaches and pears, and cantaloupes, well chewed, may also be allowed. Bananas and berries are objectionable.

In cases in which atrophy of the gastric tubules is present, if motility is well preserved, the same dietary is permissible, there being administered with each meal a full dose of papain. Diastase is less essential, as, with absence of acidity, starch digestion in the stomach, provided proper mastication has preceded, is in no way interfered with. In these and in cases of gastritis in which the nutrition is much impaired through imperfect digestion, predigested foods, such as somatose and sanose, Mosquera's beef-meal and beef-jelly; the cereals, first predigested, are demanded. Whipped eggs in the shape of flip and of egg-lemonade commonly agree well, passing in liquid form into the bowel and there undergoing digestion and absorption.

Alcohol in acid and in mucous gastritis is not permissible. In the subacid and atrophic forms, a small quantity of well-

diluted whisky at meals, Rhine, Sauterne, sherry, or Madeira may be allowed.

Gastric Ulcer.

Synonyms.—Simple, round, peptic, eroding, or perforating ulcer.

Definition and Varieties.—Gastric ulcer is characterized by a solution of continuity of a limited portion of one, or more commonly all the coats of the stomach-wall, resulting in an open sore of varying extent. In the acute form the sore has the appearances suggestive of that which would be made by a "punch" instrument. In the chronic variety, resulting from a slower process, a much greater area may be involved; so that there is a shelving tendency from the mucous and submucous coats to the muscular and peritoneal ones, the whole assuming a somewhat funnel-like appearance. The chronic form, under favorable circumstances, tends toward cicatrization. The acute shows a less benign inclination. Deformities of the stomach-wall, such as hour-glass contraction, should the ulcer occupy the body, or pyloric obstruction, when the ulcer is in the vicinity of the pylorus, are not uncommon results of cicatrization of chronic ulcer. In both the chronic and the acute form a tendency to hæmorrhage and perforation of the stomach-wall exists. Duodenal ulcer is closely related in character to gastric ulcer. Erosions of the stomach, which are miniature ulcers of the mucosa, wholly differ from peptic ulcer, in symptoms, character, and course. What is known as carcinomatous ulcer is usually carcinoma ingrafted upon what was primarily a simple benign ulcer; but gastric carcinoma itself frequently ulcerates. Single or multiple gastric ulcers, not presenting the usual aspects of peptic

ulcer, may occur as the result of tubercular and syphilitic infection. Neither is common, and the diagnosis in life is difficult.

Symptoms.—A typical case of gastric ulcer presents very distinctive symptoms: these are localized, peculiar pain; vomiting; gastric hæmorrhage, showing itself as hæmatemesis, or less often by the blood appearing only in the stools. There are also other digestive disturbances, such as those attending the frequently existing hyperchlorhydria. Latent ulcer is really rare; most so-called latent cases are those in which either slovenliness in examination or ignorance on the part of the attendant causes him to slip in diagnosis, or they are cases in which there was failure on the part of the patient to consult a physician for symptoms, which, though slight, would have been obvious enough.

Pain is seldom, if ever, absent during the course of gastric ulcer, although it is not invariably of that character seen in typical cases. Pain may be caused by the influence of the eroding process on the sensory-nerve filaments or by irritation of the sore by food and drink, and by the corrosive action of the secreted HCl. Pain may be constantly present or may be intermittent, fixed, or paroxysmal, but is commonly both; it is most intense immediately or soon after the ingestion of food or drink, and is aggravated if chemical, thermal, or mechanical irritants are contained therein. Exceptionally the pain may not be aggravated for an hour or two after ingestion of food. When this is the case, the suspicion should be entertained of ulcer situated rather in the duodenum than in the stomach. Posture often has a marked influence on the time of appearance and the duration and severity of pain. The pain is usually both local-

ized and lancinating. The localized pain is apt to be present in a limited, small area, in both the epigastric and the dorsal region. The epigastric site of pain is often very local, and is situated at a point immediately below or not much more than an inch or so below the tip of the ensiform process. Here, exquisite tenderness is apt to be present to even light pressure, and deeper pressure, however gently applied, cannot be borne. The dorsal fixed pain and tenderness is commonly placed to the left of the eleventh and twelfth dorsal or the first lumbar vertebra, and is limited to an area not larger than that occupied by the epigastric pain. From these two sites the pain lancinates with paroxysmal exacerbations; these lancinating pains may even simulate angina pectoris.

Vomiting, though very common in ulcer, does not occur with such invariability as the before-discussed sign. Vomiting is usual in cases of ulcer, and is seldom entirely absent throughout the course of the disease. It is commonly brought about by the irritating action of the ingesta and the superacid HCl secretion on the ulcer itself, and on the hypersensitive stomach, and by the aggravation and pain so produced. Vomiting may occur immediately after the ingestion of food or drink, but, as a rule, it is less usual until after the lapse of from one-half to two hours. The character of the vomit in a case of suspected ulcer should be ascertained, and the presence or absence of blood looked for macroscopically, microscopically, and chemically, and, if the stomach-tube cannot be employed for such examinations, the total acidity and the percentage of free HCl should be determined.

Hæmorrhage occurs in about 50 per cent. of all cases of gastric ulcer. When profuse or noted with some frequency,

even in small amounts, it furnishes the strongest possible evidence of ulcer. If vomiting is not a constant symptom, small hæmorrhages, however, frequently repeated, may alone manifest themselves by examination of the stools. Physical exertion and the digestive act both favor the development of gastric hæmorrhage, as does emotional excitement. It also seems to be more usual at the menstrual period. The stomach-tube must be employed with discriminating caution in ulcer in which a tendency to hæmorrhage exists. One not skilled in its use should avoid its application. The fæces should be carefully and systematically inspected, and examined microscopically and chemically, if other indications of gastric hæmorrhage are not evident. It should be remembered that with the administration of a salt of bismuth or of iron the fæces are of a dark color. The occurrence of a profuse hæmorrhage causes the characteristic signs of shock; these may exist without the blood being vomited.

Chlorosis, or more advanced chloranæmia, often precedes the development of gastric ulcer. The morbid condition of the blood becomes naturally much accentuated by virtue of the lessened intake of food, the vomiting, pain, and by the occurrence of hæmorrhages. The blood-changes in a long-standing case are those of a secondary anæmia.

Other symptoms of gastric ulcer: The percentage of HCl in the gastric juice is usually increased, at least in the earlier stages, and this augmentation in many cases has long preceded the advent of ulcer. Diminution occurring in the course of the disease is usually the result of an ingrafted gastritis. Rarely in gastric ulcer total absence of the secretory function is observed.

The appetite is commonly well pre-

served, save in long-standing cases, when cachexia is present.

Gastric and intestinal flatulence are not uncommon, due to a nervous influence, or perhaps to imperfect starch digestion, with neutralization of the pancreatic secretion, and destruction of its ferments, through the action of the superacid gastric juice.

Pyrosis, or mere heart-burn, is usual.

There is nothing peculiar in the condition of the bowels. If little food is taken and vomiting is usual, constipation is the rule.

In cases with hyperchlorhydria the urine shows changes incident to that state: a tendency to low acidity or to persistent alkalinity.

Fever is absent unless as a result of a complication.

Prognosis, Duration, Complications, and Consequences of Gastric Ulcer.—

Gastric ulcer is a disease which, when encountered early, is very amenable to treatment. The prognosis, however, under any circumstance, must be guarded: the possibility of erosion of a large vessel, of perforation, of such a consequence as cicatricial stenosis of the pylorus, the frequency of relapse, should all render one cautious in hazarding an opinion as to ultimate recovery. It may be said, however, that with the intelligent co-operation of the patient a majority of the cases may be cured and relapses prevented if coming under observation at a not too late stage in the disease.

The duration of gastric ulcer is a very varied one. In cases not under favorable treatment ten years and more have been recorded.

Diagnosis.—This is not a matter of difficulty in typical cases. The characteristic localized pain, intensified by pressure, with the presence of emaciation, and with at least a moderate chlora-

næmia, render the diagnosis probable, even when vomiting is absent and hæmorrhage not evident. The occurrence of hæmatemesis, with the characteristic pain, can leave little doubt if carcinoma can be excluded.

To one acquainted with manipulations of the stomach-tube and the methods of ascertaining by its aid the conditions of the gastric functions, the separation of carcinoma from simple ulcer is, as a rule, easy, taking into account other important differences usually manifest. The early absence of free HCl from the gastric secretion in cancer, with diminution in the ferments, and the presence of the organic acids, chiefly lactic when the growth occupies the pylorus; the impairment, also, of the motor function, the character of the blood that is vomited, and perhaps the presence of tumor, all tend to render the separation simple. The age; family history, the comparatively early appearance of cachexia and of marked wasting in the presence of a lack of history of gastric disorder of long standing are also points of some value in differential diagnosis. The cancerous degeneration of chronic ulcer is far more difficult to recognize than is simple carcinoma, and often the recognition for a long time can be but conjectural, based on the ephemeral improvement of symptoms under treatment that experience has shown is usually remarkably successful in the cure of ulcer.

The occurrence of lancinating and sharply-localized pain increased by the ingestion of food or drink, of hæmatemesis, and of vomiting tends to separate simple hyperchlorhydria and acid gastritis from ulcer.

Etiology.—Gastric ulcer is of more frequent occurrence than is generally supposed. In 5 per cent. of deaths from all causes cicatrization of an old ulcer or

an open ulcer is encountered. The ratio of cicatrix to open ulcer is about three to one. Gastric ulcer is more common in northern than in southern latitudes and is apparently less frequent in America than in Europe. Some parts of Europe seem to be exempt. The etiology of most cases of gastric ulcer is still involved in obscurity. Usually more than one causative factor is operable. Some of these are: disturbances in the vascular supply of the stomach, injury to the stomach-wall, deterioration in the general health, diminished alkalinity of the blood, and long pre-existing hyperchlorhydria (this, chlorosis, and trauma are, united, presumed common factors in women); age and sex furnish a predisposition. The most usual age for its occurrence is between twenty and forty; it is rare in young children and after the sixtieth year. It is about twice as frequent in women as in men; the predisposition in the former sex being favored by the more common occurrence in them of anæmia, chlorosis, a neurotic temperament, and, it is asserted, gastroptosis; loose kidney (in the writer's opinion) may act as a predisposing cause. Occupation can have but a very indirect influence. Disease of the circulatory apparatus, involving either the heart or the blood-vessels, extensive skin burns, and infectious diseases are to be regarded as etiological factors.

Pathology.—The ulcer may be single or multiple, but commonly only one chronic ulcer exists. The most usual situation of the ulcer is in the pyloric region, and on the lesser curvature and toward the posterior wall. Its size is variable; the usual diameter is from one-half to one inch. The shape, which frequently varies, is oval or round, with a funicular or crater-like form. The base of the cone is at the mucous sur-

face and the truncated portion on the peritoneal coat or the surface of an adjacent organ, such as the liver, pancreas, or spleen. The edges are apt to be thickened; the bottom of irregular shape or yellowish color; smooth or rough, showing, perhaps, portions of slough on the surface. The gastric wall for a moderate distance around the ulcer, when the latter is of long standing, generally shows evidences of inflammatory change. With involvement of the peritoneal coat in the ulcer-cavity, a localized or more general inflammation of this membrane exists. In about 50 per cent. of all cases adhesive inflammation occurs to an adjacent organ or part.

An ulcer commonly terminates by cicatrization; deformity of the stomach-wall may result in consequence. In a small percentage of cases perforation of the stomach-wall may occur, or death may take place from uncontrollable hæmorrhage, due to the rupture of a large vessel. Perforation is more common with ulcer on the anterior gastric wall. Perforation, according to the situation of the ulcer, may result in purulent peritonitis, or in an abscess in neighboring organs, or in the formation of a fistula.

The acute gastric ulcer is usually of smaller size than the chronic form. Its usual appearance is that of having been gouged out of the mucous membrane. The edges are little or not at all thickened, but are apt to be deeply congested. The appearances of the ulcer are those of an inflammatory process ending in necrosis, such as is produced by acute bacterial infection. The situation of the acute gastric ulcer is usually the pyloric region.

Complications. — The most common are perforated peritonitis and cicatricial pyloric stenosis. Far less often seen are

development of a carcinoma at the site of the ulcer and hour-glass contraction of the stomach. Grave anæmia, simulating the progressive pernicious form, is sometimes observed in consequence of an untreated or mismanaged case.

Treatment.—The writer here will briefly describe only the treatment which, as a rule, he employs and has found of the greatest benefit. The prime object is to give the stomach almost absolute rest for as long a time as the exigencies of the case will permit, in order to promote more or less complete cessation of its motor and secretory functions, by making little or no demands on that organ, and thus irritation by food, by muscular and glandular activity, being reduced to a minimum, and the bodily nutrition at the same time being maintained, impediments to cicatrization are removed. Healing is also favored by a neutralization of the gastric secretion by appropriate antacids and by the employment of remedies exerting a soothing action on the ulcerated surface and upon the hypersensitive mucous membrane. The writer rarely treats a case of chronic ulcer, unless a marked tendency to hæmorrhage exists, without the stomach-tube, by which he employs remedies impracticable of use otherwise.

The patient is sent to bed for a period of from ten days to three or more weeks. For from ten days to two weeks he is to be fed solely by the bowel. All food, even milk, by the mouth is to be prohibited. Fluids, save sufficient water in which to administer the remedies ordered, are to be withheld, on account of their tendency to excite the secretory and motor functions. Thirst is assuaged by the use of pellets of ice, or by water enemata, at the time of the cleans-

ing irrigations. Water by the mouth must be especially forbidden in cases in which vomiting is a troublesome symptom.

The technique of bowel-feeding, including the form of enema preferred by the writer, is as follows: At the outset, a laxative, preferably 2 grains of calomel, may be indicated, to be given on the empty stomach, and only such nourishment as peptonized milk or peptonized milk-gruel is to be permitted by the mouth until the bowels have freely acted and again become quiet. The occurrence of hæmorrhage or of frequent vomiting contra-indicates the employment of a purgative; then a large, warm-water, cleansing enema may be used instead.

The feeding by the bowel is to be given at intervals of approximately eight hours; as at 7 A.M., 3 and 11 P.M. Some variations may be required. One hour before the afternoon and evening feeding the sigmoid flexure is to be irrigated by a pint or more of plain warm water or warm salt water. This the patient is encouraged to void after a few minutes. About three-quarters of an hour later the nutritive enema is introduced. The patient assumes the left side with the knees flexed, the pelvis being elevated by the aid of a pillow. The enema is administered preferably through a moderately firm rubber rectal tube, to which is attached a stretch of rubber tubing about five feet in length at the extremity of which is a glass funnel. The rectal tube should have a closed end and a large velvet-edged lateral eye. After warming and oiling, it is carefully inserted as high into the bowel as possible—it should at least reach the promontory of the sacrum. If the tube can be gently passed to the extent of twelve or even eighteen or

twenty inches, it renders the operation much more likely to be successful.

COMPOSITION OF THE NUTRITIVE ENEMA.—The writer commonly employs the following: A heaping teaspoonful of somatose is dissolved in as little water as possible. One large or two small eggs are now thoroughly whipped with this and then incorporated with either 4 ounces of peptonized milk-gruel or with two heaping tablespoonfuls of Mellin's food, prepared *secundum artem*. Instead of Mellin's food or the peptonized milk-gruel, 4 ounces of moderately-thick, unpeptonized gruel made of the flour of barley, wheat, or oats, and run through a fine sieve, may be used. The whole enema, when of this composition, must not exceed 8 ounces, and should preferably be less. Papain for the digestion of the egg and taka-diastase for that of the unpeptonized gruel may be added with advantage. Two to 4 teaspoonfuls of Mosquera's fluid beef-jelly further increases the efficiency of the enema, used after bowel-feeding is found to be well borne. Apart from its extreme nutritive value, the salts contained in it are of use in aiding the absorption of the emulsified eggs and in producing an antiperistaltic movement in the bowel. Without the use of the beef-jelly, a mere pinch of salt may be added to the enema. Too large a quantity will retard absorption and irritate the bowel. The enema is better tolerated in the colon than in the rectum and absorption is there more rapid. It is important also to recall that the veins draining the colon reach the liver directly. Albuminoids passing primarily to the liver are so altered that they are more easily retained in the circulation.

The enema being well borne, iron in the form of an albuminate (the writer

prefers Drees's preparation) is added in doses of $\frac{1}{2}$ to 1 ounce.

The enema must be introduced at a temperature slightly above that of the body. If the anal orifice is unduly sensitive to the passage of the rectal tube, it is well to employ, shortly before each enema, a suppository containing 3 grains of iodoform. To this may be also added for a time or two: cocaine hydrochlorate, $\frac{1}{4}$ to $\frac{1}{3}$ grain; codeine phosphate, $\frac{1}{2}$ to 1 grain; extract of hyoscyamus, $\frac{1}{2}$ grain.

Local Treatment of the Ulcer. — In those in whom the stomach-tube can be employed with a fair degree of safety, and this includes the majority of cases, the following local measures, briefly cited, are used: Silver has been employed by the writer in the past ten years with the most gratifying results in cases of not only ulcer, but in those of simple hyperchlorhydria and in cases of chronic gastritis. In the treatment of ulcer he has so used bismuth for a longer time, and alumnol for the past six years. The employment of alumnol in cases of superacidity and in gastric ulcer is original with him.

With the patient recumbent, and a decubitus to the right, the stomach first being cleaned with pure water, 500 cubic centimetres of a solution of silver nitrate of a strength of 1 to 1000 are passed into the stomach; the tube just engages the cardiac orifice. After two to three minutes the silver solution is withdrawn, the tube first being farther introduced so that the intragastric extremity reaches the lowest part of the stomach, the position of which must first have been ascertained. Immediately after the introduction of the solution the patient is made to assume such positions as will tend to bring the solution into contact with the presumed affected part of the

stomach. After the withdrawal of the silver solution the stomach is immediately washed with cool or warm water until the washings show no coloration of silver chloride; commonly three funnels of water are sufficient. Finally a teaspoonful of bismuth in 3 to 4 ounces of water is passed into the stomach. The patient now, as when the silver wash was used, lies in such a position that the bismuth will come into contact with the presumed affected part of the stomach. If no nausea exists during the presence of the silver in the stomach, the solution may be retained upward of three minutes, especially if a bandage is placed about the abdomen at the level of the umbilicus. The silver application is made every third day for two weeks and then at a longer interval. Daily, when the silver is not used, 500 cubic centimetres of a 1 to 500 solution of alumnol and 1 heaping teaspoonful of bismuth subnitrate is introduced. At the end of three minutes the solution is syphoned out without the introduction of more water, so that the bismuth deposited upon the stomach-walls be not disturbed. Nausea does not usually occur from the alumnol. It is without toxic effect.

In cases of great debility and tendency toward hæmorrhage such local treatment must be omitted. Instead, three times daily, a small teaspoonful of bismuth in 3 to 4 ounces of water is to be given by the mouth, the patient then assuming for a few moments the posture cited.

Local treatment with silver and alumnol must be continued from one to three months in a case of long-standing ulcer.

During the early period of the treatment, while the patient is abed, hot or cold compresses to the epigastrium are beneficial, but hot compresses are never to be used when there has been recent hæmorrhage. The Preissnitz applica-

tion is often of great service in relieving local symptoms. The writer employs it in most cases of ulcer.

The symptomatic use of antacids in ulcer is of distinct service. In the writer's experience, the following combination is the best: Sodium bicarbonate, calcium carbonate, magnesia usta, of each, 1 ounce; oil of anise or oil of peppermint, 15 to 20 minims. This is dispensed in a wide mouth bottle, from which $\frac{1}{4}$ of a small teaspoonful to $\frac{1}{2}$ or more is taken, mixed with water, as occasion requires. When there is a tendency to constipation or to unpleasant sensations in the stomach from the evolved gas, calcined magnesia or milk of magnesia is preferable to sodium or calcium carbonate. When diarrhœa exists, prepared chalk is to be preferred.

TREATMENT OF CERTAIN SPECIAL SYMPTOMS.—Vomiting, however obstinate previously, usually ceases within a few days after instituting bowel-feeding, when nothing is allowed by the mouth. If hot or cold applications are resultless, a small blister, one and a half inches square, is applied to the epigastrium. If mouth-feeding must be continued, only the smallest quantity of peptonized milk-gruel, expressed meat-juice, or koumyss, or some such light food, should be allowed. No medicine can be expected to invariably control vomiting in ulcer. (See the treatment of vomiting [ACUTE GASTRIC CATARRH].) Morphine hypodermically may be required, other remedies failing. Strontium or sodium bromide by the rectum is often of signal service in controlling the vomiting (40 grains in 3 ounces of water).

Treatment of Gastric Hæmorrhage Occurring in Ulcer.—Absolute physical and mental rest is enjoined. Nourishment must be solely by the bowel. Cold applications are applied to the epigastrium.

Morphine is administered hypodermically in a full dose. Ergot is of no utility in bleeding from erosion of an artery. It had better not be employed. Hydrastine hydrochlorate is worthy of trial given hypodermically at intervals of two to three hours ($\frac{1}{4}$ to $\frac{1}{2}$ grain). Fluids taken by the mouth should be cold. Pellets of ice may be swallowed to allay thirst and a light-weight ice-bag applied to the epigastrium. The extremities must be kept warm. The foot of the bed is to be elevated if necessary and the extremities bandaged. Hypodermoclysis may be required. If so, sterilized, normal salt solution may be employed or preferably the solution of tribasic calcium phosphate and potassium chloride. The colon may be flooded with hot salt solution. Instead of hypodermoclysis, the solution may be passed directly into a vein. Strychnine, atropine, and perhaps also digitalin, may be required hypodermically to sustain the flagging heart. Hypodermic injection of camphor is also of service in this direction.

There is no question as to the immense benefit to be obtained by complete rest and bowel-feeding in ulcer, even though local treatment is impracticable, and even the use of bismuth by the mouth by reason of great gastric irritability or hæmorrhage, cannot be employed. With anæmia controlled by the addition of iron to the nutritive enema and symptomatic conditions otherwise met, great improvement may be expected at the end of a week or two, when it is thought desirable to begin cautiously mouth-feeding.

Mouth-feeding Subsequent to that by the Bowel.—It is not to be begun for a week after vomiting and localized pain have disappeared. The most extreme caution should be enjoined as to this to

obtain the best results. Several weeks should elapse before other than the simplest food is administered.

As to the use of milk in gastric ulcer a word must here be said: Milk given with the idea of maintaining the stomach in a state of rest is a fallacy. Only in the very rare cases in which there is absence of the secretory function would milk pass as a bland and unirritating liquid into the duodenum, to be digested in the bowel; but with preserved or heightened secretory function milk must act somewhat as an irritant. In hyperchlorhydria there is always a large amount of the milk-curdling ferment in the gastric juice, and the consequence is that firm coagula promptly result, which must be irritating to the ulcer and stimulating to the motor function as other solid food. Milk is scarcely rendered more digestible by the admixture of an antacid to the milk for reasons I have detailed at length in another publication. Briefly, it should be said that the curdling of the milk is thus rather enhanced (in cases of hyperchlorhydria) and its subsequent digestion interfered with. If milk is used at all in gastric ulcer it should be first pancreatized. It is thus so changed that formation of more than traces of curd is impossible, and it is in condition to pass at once predigested into the bowel for rapid absorption there to occur. Antacids may then be freely and harmlessly given to neutralize the HCl of the gastric secretion, as the latter is not required for digestion of the milk-curd. Then little or no demand will be made on the secretory function, and the motor function will also be practically untaxed. The great objection to peptonized milk is its taste. This is partially obviated by not prolonging the period of peptonization beyond the faintly bitter stage and then

raising the temperature of the milk to a point sufficient to destroy the contained ferment. The milk should not be boiled. Better than peptonized milk is peptonized milk-gruel. The writer almost habitually employs a diet of peptonized milk-gruel in all cases of ulcer in the early part of the treatment, when feeding by the bowel is not practiced. He commonly also uses it as the first food for a number of days on the cessation of bowel-feeding, giving antacids systematically when there is hyperchlorhydria. But small quantities are allowed at first. It is well to start with a tablespoonful of peptonized milk-gruel every half-hour until 3 to 6 tablespoonfuls are taken. Later give 1 ounce every hour for three or four feedings, then 2 ounces every two hours for two or four feedings, and then 3 ounces every two hours. Increase this on the third day to 4 ounces every two hours, and this gradually increase to 6 ounces in the same time. Somatose is now combined with the milk-gruel, at first in $\frac{1}{2}$ -teaspoonful doses until on the third or fourth day after starting it a heaping teaspoonful is taken at every alternate feeding. On instituting mouth-feeding the bowel-feeding is not discontinued abruptly. At first the midday feeding is omitted; in two or three days either the morning or evening feeding is dropped; and, finally, in a day or so, the stomach continuing tolerant, bowel-feeding is stopped. The solution of albuminate of iron mentioned is given alternately with the somatose, and after a time in a small dose with each mouth-feeding. The initial dose of the iron solution is 20 drops, increased by 5 to 10 drops, until a large teaspoonful is reached, and this at the end of a week is increased to 2 teaspoonfuls four times daily, and this later to a tablespoonful.

At the end of two weeks after discon-

tinuance of bowel-feeding or three to five weeks when this has not been practiced, unsalted broth of mutton, or chicken, thickened with farina, or thoroughly cooked barley or rice, and subsequently strained, should be given. Alternately with this a beaten white of egg is added, somatose being still continued. Somewhat later gelatin and *purées* of young pease, beans, asparagus, and potato are allowed, as is either the pulp of scraped, lightly-broiled tenderloin steak, or the pulp of raw steak; the last then formed into cakes, quickly cooked on a very hot griddle. The white of a coddled egg may now also be taken, eaten with the addition of a few bread-crumbs, a little butter, and a pinch of salt. This agreeing, on another day two whites may be eaten; and, finally, gastric symptoms being practically absent, the whole egg may be taken.

Overtaxing the stomach must be guarded against. The bodily nutrition must be raised and held so that complete and permanent healing of the ulcer occurs. On the slightest appearance of renewed symptoms a recurrence to the simplest kind of food must be had or even bowel-feeding again instituted. Gruels of wheat, barley, or oats, the meal finely ground, not salted in cooking, to which milk is added afterward, may be tried in small quantities to replace the peptonized gruel at the end of ten days. A small quantity of an active diastasic preparation had better then be coincidentally taken.

Dilatation of the Stomach.

Synonym.—Gastrectasia.

This term is somewhat unfortunately employed to indicate a distinct morbid entity. No exact standard of gastric capacity exists for height or make-up. It is held that a stomach may be capacious (megalogastria) and yet not be, strictly

speaking, dilated. Yet there is a limit of capacity beyond which dilatation may be said to exist, although symptoms of gastrectasia are not very evident; in all probability they have existed, though unnoticed, and the gastric peristole is temporarily sufficient. This limit of capacity per average height the writer places as approximately 1800 cubic centimetres; and yet a stomach of less capacity may be chronically so myasthenic as to constitute dilatation for that individual. The presence of gastric dilatation is always indicative of some undue delay in the passage of food into the bowel. It is therefore characterized by atony of the stomach: *i.e.*, weakness of the gastric expulsive forces.

Varieties.—It is proper and more convenient to include under dilatation (1) *gastric atony* or *myasthenia*, occurring in a stomach the capacity of which is not beyond what is considered the normal, but causing symptoms of moderate dilatation. (2) Dilatation in which the gastric capacity is increased, little or much, not due to pyloric obstruction—*atonic dilatation*. (3) *Mechanical dilatation*,—that due to obstruction at or beyond the site of the pyloric sphincter.

Symptoms.—With mild atonic dilatation, constituting merely gastric atony or myasthenia, the symptoms, briefly, are those ordinarily described as so-called atonic dyspepsia: habitually furred, flabby tongue; foetid breath; more or less anorexia; considerable thirst (in advanced cases); sensations of decided weight and oppression in the stomach after meals; constipation; mental hebetude, and disturbed sleep. Headache and attacks of vertigo are not uncommon. With these should there be, as is less common, hyperchlorhydria, there is a sensation of burning at the pit of the stomach superadded, occurring two or

more hours after a meal and continuing until food is again taken. Gaseous eructations may or may not occur in cases of moderate severity.

Examination with the stomach-tube shows considerable delay in the passage of food into the bowel, although no food-remnants may be found in the fasting stomach in the morning, about 12 or 14 hours after the evening meal. In many cases of moderate dilatation usually there are only such symptoms as these, and certain of them may be absent excepting a sensation of weight and distress after meals.

The employment of ordinary percussion, auscultatory percussion, distension of the stomach with air and with water, and inspection of the transilluminated gastric area will separately or combinedly generally show, in these cases of atonic dilatation, the inferior curvature of the stomach to be lower than is normal, and the gastric capacity to be more or less above the normal.

The above symptoms may alone be present, with vomiting quite unusual, and yet a considerable grade of atonic dilatation be present.

In such cases there is a so well preserved or newly gained (through active treatment) hypertrophy of the gastric muscle and well-developed abdominal muscles, with excellent positive abdominal pressure, as to tend to prevent a high grade of insufficiency; so that, although stagnation of food occurs, 8 to 10 hours being required for the stomach to thoroughly empty itself after a large meal, which normally should disappear in 6 to 7, it is not sufficient for vomiting to be a symptom, unless the stomach has been habitually overtaxed for some time and the stomach-tube has not been employed.

Vomiting is always a feature in dilatation from obstruction, as it is finally

in advanced atonic dilatation, in which decided stagnation of food is usual; so that that eaten the day before is retained at the end of 12 to 14 hours. The striking feature about the vomiting in gastric dilatation is that it is unassociated with much nausea, tends to occur at variable intervals, and is copious in quantity. The uneasiness, weight, or distress felt after eating, having been dissipated for a short time by an evacuation of the stomach-contents, recurs and augments even to the point of actual pain as each succeeding meal is taken, until, at the end of 36 or 48 hours,—or longer or shorter, as the case may be,—the contents of the stomach are more or less completely and suddenly evacuated. If not completely evacuated, vomiting will recur for a time or two within a short period, as through the night. The amount vomited, should the dilatation be great, is apt to be copious.

If the dilatation is decided, the onward passage of food into the bowel being much impeded, the vomited matter consists of partially-digested material,—all that has been eaten for perhaps several days. If vomiting occurs at intervals of only four to five days, especially in stenotic dilatation, indications of food eaten before or immediately succeeding the preceding attack may be present, the stomach not having been completely evacuated at that time. The vomited matter may be in a state of advanced decomposition, containing coffee-ground material (altered blood); abundance of lactic and other organic acids, as in carcinoma: or, as in stenotic dilatation from cicatricial ulcer, may consist of quite-well-solved ingesta, but little ill smelling, and contain an abundance of hydrochloric acid and the ferments. The variation may be all the way from the first to the second described, depending upon

the condition underlying the dilatation. Commonly, the vomited matter, allowed to sediment in an appropriate vessel, will promptly separate into three layers: an upper, a brownish, slimy scum, consisting of mucus, fungi, and elements of food of light specific gravity or yeasty material, etc.; a central, more or less colored fluid; and the lowest stratum, consisting of heavier solids in which altered food and blood (as in carcinoma) are more or less recognizable. Usually micro-organisms—such as schizomycetes, yeast-fungi, and sarcinæ—exist in the sediment in large number. With the absence of free HCl and the presence of lactic acid, the Oppler-Boas bacillus is apt to abound. Yeast-cells are found in the absence or in the presence of HCl. *Sarcinæ ventriculi*, the presence of which in a dilated stomach was formerly regarded as indicative of carcinoma, are now looked upon as telling in the other direction. Sarcinæ seem to thrive best in stomachs in which moderate traces of free HCl exist.

Gastric pain is not itself a symptom of dilatation; if present it is due to a concomitant disease, such as carcinoma, or is the result of gastralgia or of pylorospasm.

Constipation is usual, varying in grade, dependent upon the degree of stagnation in the stomach-contents, and, in myasthenic dilatation also, upon the accompanying atony of the bowel.

The urine is diminished in amount, of relative high specific gravity and color, and there is a diminution in chlorides and markedly in urea.

The general health naturally suffers greatly in pronounced dilatation.

Diagnosis.—This is unattended with special difficulty, even though characteristic vomiting is not a prominent symptom. A mere inspection will often disclose the outline of the dilated

stomach before it is distended with gas. Waves of peristalsis passing from right to left, active in cases of stenotic dilatation, are frequently seen if the stomach is much increased in size: these reaching the pylorus, should this be the seat of a neoplasm, will sometimes outline it. Palpation readily elicits an extensive splash-sound some hours after food or drink has been taken. This, in modified degree, is present in simple myasthenia without increased gastric capacity, although to a less extent and for a far less period. Ordinary percussion and auscultatory percussion will show the inferior curvature lower than normal, but will not enable a separation to be easily made from gastropotosis, although theoretically in gastropotosis the inferior boundary of the stomach does not further descend with the inspiratory act. The most useful mode of ascertaining dilatation, and separating it from a stomach of normal capacity or of one dropped, is by rapid inflation with air through the stomach-tube, by means of the writer's exhaust and compression bulb attached to the exhaust-bottle; the stomach will ordinarily promptly outline itself on the abdominal wall. The writer has never had unpleasant results occur by this method of inflation, although he has employed it in hundreds of cases in the past ten years. It is important, not only for diagnostic means, but for therapeutic measures as well, that the patient be quickly habituated to the use of the tube. After this habituation is acquired, which ordinarily occurs in a day or two, the gastric capacity may be fairly well ascertained by means of the stomach being distended with water at a temperature agreeable to the patient and entered under low pressure. As much must be borne as can be without painful distension, and

that removed measured. This procedure, repeated on one or two occasions and the mean taken, is of value. A measure of the capacity may be also simply made by distension with air, and connecting the stomach-tube to an immersed graduated flask containing water. Gastro-diaphany the writer has employed considerably for the past decade, but he regards it of less value as a means of diagnosis than air-inflation or water-distension. It is of little value in the separation of dilatation from a dropped stomach, unless transillumination is practiced through at least a litre of water.

The writer not infrequently sees cases of gastropptosis in which, without any indication of increase in size of the stomach, dilatation has been diagnosed by other practitioners, simply because the inferior curvature of the stomach has been found to be lower than normal.

Vomiting of the nature and character before described is a valuable diagnostic sign of simple or of obstructive dilatation, as is the invariable presence at some period of the disease of semiliquid or liquid contents in the fasting stomach ten or more hours after food has been taken, as in the morning on rising.

The amount present in the fasting emptied stomach at a definite time after a measured amount of food and drink has been taken gauges the extent of the failure of the motor function, and easily separates an abnormally large, though sufficient, stomach (megalogastria) from an insufficient, dilated one. The method of Ewald and Sievers of ascertaining the motor power of the stomach by means of salol is of little value.

Etiology.—Myasthenia of the stomach and atonic dilatation are originated by some defect in the nervo-motor mechanisms of the stomach, which may be either congenital or acquired. A tendency to

lack of general muscular tone, to flaccidity of muscle-fibre, and to readily-produced partial atony of the same is inherent in many, and is perpetuated by an unhygienic mode of life. Improper eating, though a constant and the chief factor, is but one of many operative in the production of slight or considerable atonic dilatation in these. A chronically more or less imperfectly acting motor function, with or without fair secretion of gastric juice, permits the stomach to be rarely, if ever, free from food but for a short period in the twenty-four hours. Long-continued tendency to stagnation of food originates fermentative processes in the stomach, whether there be abnormalities of the secretory functions or not, and mild gastritis is eventually set up. This leads to atrophy of the muscle-fibre, and, as a result, the motor insufficiency is apt to steadily increase and the stomach-walls to yield. Overeating, with imperfect mastication and excessive imbibition of fluids, tends to cause atonic dilatation. Dilatation is the easier produced, the lower the motor tone of the individual. Some have, habitually from youth up, flabby voluntary muscles, which even systematic, properly-regulated exercise fails to markedly toughen. These are apt to have a tongue the lateral aspects of which are habitually indented by the pressure of the teeth. In such gastric atony is common, or at least may be readily produced.

Inattention to proper habits of eating and drinking in the line of excessive indulgence leads to more or less increase in the gastric capacity and to the augmenting of symptoms of insufficiency. In many the loss of tone is shown in the tendency to either a partial or general descent of the abdominal viscera. There may be a general prolapse (splachnoptosis) or simply dropping of the stomach

(gastroptosis); this last is usually associated with nephroptosis (looseness of the attachment and descent of the kidney, usually the right), and often conjoined with partial or general prolapse of the bowel (enteroptosis). These subjects, even if there be only combined gastroptosis and nephroptosis, without displacement of the other viscera, have almost habitually gastric or gastro-intestinal atony. Very commonly in the writer's experience a certain amount of gastric dilatation becomes superadded. Ewald holds that a vertically-placed stomach, not infrequently seen in those in whom the general or partial ptosis of the viscera is a result of tight lacing, is always dilated. The writer has noted several exceptions to this, however. It has been held that obstruction exerted by pressure of a displaced right kidney on the descending portions of the duodenum will originate dilatation through a tendency to partial obliteration of the bowel favoring gastric stagnation. Doubtless in the subject of gastric atony this is a contributing factor, when present. Displaced kidney is, however, so common in women without dilatation, though with gastroptosis, that this cannot be regarded as the common factor productive of gastric dilatation that certain writers imagine.

Marked loss of gastric motor tone may be of acute onset, so that dilatation will appear as an acute condition. Thus, atonic dilatation of the stomach has been noted to suddenly appear in the course of a protracted illness, such as typhoid fever. This form is due usually to paralytic superdistension of the stomach with gas, rarely as the result of fermentation. Habitual distension of a more or less atonic stomach with food or drink would easily lead to increase in its capacity mechanically by the weight of the con-

tents tending to stretch the stomach-wall, and through the production of gases, the result of fermentation of the stagnating contents. Excessive beer-drinking is unquestionably a frequent cause of gastric atony and of subsequent dilatation. Dilatation may be set up in a comparatively short time by beer-drinking in this way. It is unfortunate that even among college-lads of education and presumed intelligence, and not solely among the lower classes, there is a tendency to abuse the stomach by bouts of excessive beer-drinking. The writer knows of city-bred medical students who have considered it a feat to drink in a short sitting an extraordinary amount of beer. Dilatation may easily, too, be set up by excessive water-drinking. Some decades ago a set of individuals, most of whom were uneducated, and ill-balanced mentally, following in the lead of Priessnitz, as concerns the employment of water in disease, advocated hydrotherapy as a cure-all. These issued numerous special treatises on the subject, generally advocating, as a part of their system, two meals a day for all classes of individuals, and as much water-drinking as possible. Excessive appetite induced by long fasting and impaired nutrition, the last as the result of the deprivation of animal food, naturally led to overdistension of the stomach at a meal, producing thus, doubtless, in many atony and finally dilatation. Many of the apostles of this set advocated the drinking of an enormous quantity of water, especially on rising in the morning and on retiring at night. A mere megalogastria would not alone be thus produced; symptoms of dilatation naturally should soon be expected. Excessive water-drinking at the various spas is, no doubt, often the cause of a moderate amount of gastric dilatation. I have noted, at these, indi-

viduals drinking in the course of an hour an extraordinary number of glasses of water, fancying they were benefiting their health thereby. Undoubtedly those who attempt to live solely on milk and perform the ordinary duties of life lay a sure foundation for considerable dilatation of the stomach. I have seen instances of atonic dilatation so set up.

ETIOLOGY OF DILATATION DUE TO OBSTRUCTION FROM THE OUTLET OF THE STOMACH.—Pyloric stenosis is commonly originated either by a contracting cicatrix of a healed ulcer situated near the pylorus or by carcinomatous infiltration of the pylorus. Simple hypertrophy and hyperplasia of the pylorus unassociated with ulcer and cancer sometimes occurs, and naturally tends to produce dilatation. This, in the writer's experience, is not an uncommon cause of dilatation in certain cases of long-continued hyperchlorhydria. The writer has had two examples of this recently under observation. In one continuous hyperacidity with hypersecretion had caused attacks of very painful and obstinate nocturnal pylorospasm, for which he sought relief. Considerable dilatation of the stomach, symptoms of which had not been evident to the patient, was then found to exist. Apparently in certain cases, and more especially in the debilitated and nervous, chronic hyperchlorhydria will lead to the production of dilatation solely through maintaining a tendency to spasm of the pylorus, evidently caused by the irritation of the superacid gastric juice. In one case observed by the writer, notwithstanding a marked hyperplastic and hypertrophied pylorus, which, operation disclosed, had greatly narrowed its calibre, a searching examination in life and finally the post-mortem showing demonstrated that no abnormal increase in the gastric capacity

had occurred, although impairment of gastric motility, with stagnation of ingesta, had existed for some time. The stomach was actually symptomatically dilated, although of normal capacity.

A growth within the stomach, such as a polypus; or without, such as a carcinoma of the head of the pancreas; or obstruction by the pressure from an enlarged gall-bladder (from calculus, for instance) and the like, stenosing the pylorus or a segment of the duodenum, especially the superior horizontal portion, or obstruction in the same manner by the presence of cicatricial bands or diverticula, will originate dilatation of the stomach.

Numerous instances of congenital narrowing of the pylorus are now on record. It should be remembered that this is a cause of dilatation of the stomach in infants.

Treatment.—Attention to diet is of prime importance here. Fluids and all food tend to remain unduly long in the stomach. For this reason the former must be partaken of sparingly and the latter in an easily digested and more or less concentrated form. Carbohydrates and fats, which are digested chiefly in the bowel, and which have a tendency to undergo fermentation in the stagnant stomach, are to be permitted only with discriminating caution, as must liquid elements, which furnish small nutrition in great bulk. The diet in cases of dilatation is much that already described in the treatment of chronic gastritis: tender meats, thoroughly divided before eating or made into patties; beef, mutton, or fowl, free from fat and fibrous structure. A limited amount of farinaceous substances must be allowed, as they are craved by the patient, who cannot expect to continue long without variation on a too-restricted dietary. The best farina-

aceous substances are those containing the least amount of starch and sugar. Macaroni; stale, white, or, preferably, light whole-wheat bread; and some of the fresh green vegetables, such as young pease, asparagus-tips, and tomatoes, may be permitted, provided symptoms of indigestion are not induced or aggravated by their use. With absence of hyperchlorhydria, tender-bodied sweet grapes, the juice of oranges, and a small quantity of stewed fresh or dried apple may be allowed. Thirst-creating food must be avoided.

The amount that may be eaten at a meal, and the proper intervals between meals, can be only gauged by the use of the stomach-tube to ascertain the condition of the gastric functions. While the amount eaten at one time must not be excessive, yet the interval between meals should be such that no considerable portion is still present in the stomach when a second meal is taken. Meals succeeding each other too rapidly is the cause of most of the dyspeptic symptoms in these cases. It is the fruitful cause of carbohydrates disagreeing through the inhibiting and even lethal effect of the accumulated free HCl on the ptyalin ingested with the food or on the diastasic preparation administered.

Liquids must be sparingly partaken of, especially with the meals. Not over 6 ounces of fluid should be taken at a time. Buttermilk or one of the many preparations of koumyss, if agreeing, may be taken instead of water, if desired. Coffee and tea, especially with milk and sugar, are objectionable. Alcohol is better avoided; but, if weakness is decided, a wine of good body or a small amount of dilute spirits is allowed.

In cases in which free HCl is much diminished in amount it may be necessary to administer predigested foods,

such as is mentioned in the treatment of chronic gastritis or to give with the meals a sufficient quantity of papain to aid the digestion of the proteids taken. The combination mentioned in the treatment of chronic gastritis is of value here. Or HCl may be administered with or without pepsin, but with full doses of either strychnine or the tincture of nuxvomica, and also in combination with a simple bitter. Excepting strychnine or nuxvomica, drugs are of little utility in dilatation except to meet symptomatic conditions. Hyperchlorhydria and hypersecretion necessitate the use of alkalis several hours after food, as detailed in the treatment of acid gastritis.

The remedy of greatest value is lavage, but more especially the stomach-douche. Under its systematic, intelligent, long-continued use, with coincident careful dieting, etc., stomachs at first regarded as hopelessly insufficient have been restored to even more than a fair measure of usefulness. A tube must be employed that will not only insure removal of the stomach-contents, but will also allow the douche-effect in lavage. Alternate hot and cold water, plain or medicated, is used as cited in the treatment of chronic gastritis, the tube so employed that the water is projected from a height of three to five feet above the patient's head, the intragastric extremity just engaging the cardia. For the proper use of the tube the distance not only of the cardia from the incisors must be ascertained, but also that of the most dependent part of the stomach when this viscus contains about a litre of fluid. A graduated reservoir placed at a sufficient height and with a bulb attachment to obtain the valuable effect of intermittent projection of the hot and cold water is of extreme utility. The writer's two-way tube or that of Gross, of New York, employed

with such a reservoir, or connected with graduated flasks manipulated by an air-pump, is of great use in douching the stomach in cases of dilatation and in chronic mucous and subacid gastritis. In treatment by the tube not over 800 cubic centimetres must be entered at one time, however tolerant the stomach may be, and the amount entered and that removed must be compared. The best time for the application of lavage or the douche is in the morning at least a half-hour before food is taken.

Intragastric faradism and the interrupted galvanic current are of some value in the treatment of atonic dilatation, but not of the extreme use claimed by certain so-called stomach specialists. The writer's ten years' large experience with intragastric electricity enables him to speak with some authority on the subject.

Percutaneous application of galvanism and faradism, electromassage, and massage are also of utility in the way of imparting tone to the relaxed abdominal wall. For technique of these methods see the writer's article on treatment of dilatation of the stomach ("System of Practical Therapeutics," vol. ii, p. 963, *et seq.*). With pronounced bulging of the epigastrium, especially if coincident prolapse exist, a cushion pad suitably confined, constantly worn by day tends to relieve sensations of fullness and weight present.

The treatment of constipation occurring in dilatation of the stomach is on lines similar to that given in the treatment of chronic gastritis. Lavage and the stomach-douche are of the greatest value in this connection, and massage, electromassage, and percutaneous abdominal galvanism and faradism are also of use.

The surgical treatment of dilatation of the stomach, such as that of gastropli-

cation, or gastrorrhaphy, for reducing the size of the stomach in simple atonic dilatation; and, for remedying a stenosis of a pylorus the result of a cicatrix, or of an hyperplastic sphincter, Loretta's digital divulsion; or, preferably the pyloroplasty operation of Heineke-Mikulicz; resection of the pylorus, and the operation of gastro-enterostomy are discussed in another section.

Carcinoma of the Stomach.

Symptoms.—As gastric carcinoma does not frequently succeed chronic dyspepsia (chronic gastritis or a prolonged gastric neurosis) and only in a small percentage (approximately 5) follows or is ingrafted upon gastric ulcer, dyspeptic symptoms do not usually long precede the development of the disease. Commonly the patient, who has been in fair health, gradually loses vigor, and develops gastric symptoms, slight and obscure at first, but later becoming prominent and obvious. There is gradual, but steadily increasing, debility; emaciation; anæmia, which late in the course of the disease may be of high degree; a cachectic hue of skin; anorexia; eructations; nausea and vomiting; constipation; hæmatemesis (or oftener melæna or melænæmesis), and gastric pain (not as severe as in ulcer); and later a gastric tumor may be palpable. The course may be rapid, death occurring in two to six months from the onset,—the writer recently saw such a case,—or more usually extends over a period of from one and a half to two and a half years. Coincident rather marked loss of strength and progressive emaciation is a common and usually early symptom, antedating often the appearance of distinct gastric symptoms. The anæmia, moderate at first, becomes marked as the disease progresses. It is of the secondary type, not resembling, save in a few instances, the characteristics of pernicious

anæmia. The blood-count rarely falls below 50 per cent., and though poikilocytosis may be present, and, in advanced cases, nucleated red blood-corpuscles, the large corpuscles are wanting. There is usually a moderate grade of leucocytosis, and, though not distinctive of cancer of the stomach as was at first held, absence of a digestive leucocytosis, when the growth favors marked stagnation of the stomach-contents, with diminution in or absence of the secretory gastric functions. The cachexia, as the term is applied to the hue of the skin, consists of a pale-yellowish hue, which may be associated with brownish stains (the cachexia chloasma). The heart's action is usually enfeebled, due, in the later stage, to a fibroid degeneration. (Edema of the feet, eyelids, and ankles is then common. Toward the termination of the disease a subnormal temperature is common; but, preceding the fatal issue, fever of an irregular course may be present. Occasionally, in the course of the disease, fever due to a septic complication may occur. A distaste for food, and especially for animal food, is usual. Occasionally cases are encountered, as the writer has noted in several instances, in which the appetite is well preserved to the end. Nausea is apt to be a prominent symptom, before the occurrence of vomiting is usual. It is more common than in ulcer. The tongue may be coated or clean; as the disease advances, with the ingrafted and extending gastritis, the tongue becomes more or less habitually furred. Vomiting is a usual symptom, especially with carcinoma involving the cardia or the pylorus. It is infrequent at first, but, as the disease progresses, is of daily occurrence. It may occur immediately after food is taken, as in cancer of the cardia, or, in that of the pylorus, not for an hour or more after meals. The character of

the vomit depends upon the seat of the disease and its stage: briefly, plus the presence of blood, it has the character of that noted in dilatation of the stomach, with absence of free HCl. The vomit is usually of offensive odor, the color depending upon the character of the food taken and whether there be bright-red or altered blood mixed. Microscopically are found food-elements, epithelium (commonly of no characteristic variety), various micro-organisms, among which is, perhaps, the *Oppler-Boas* bacillus. *Sarcinæ* are far less often encountered than in benign pyloric stenosis with preservation of secretion of HCl. Fragments of the tumor are rarely found in the vomit; less rarely minute bits of the growth are encountered in the wash-water.

Free HCl (recognizable as unbound) is not invariably, but almost constantly, absent from the stomach-contents, save in the cases of carcinoma developing from simple ulcer, and also in the earlier stage of carcinoma in which no diffuse gastritis has resulted. An actual small secretion of HCl commonly takes place throughout the course of the disease, but it is so minute as to be unrecognizable by the commonly-employed tests. In cases with complete atrophy of the gastric tubules alone is it absolutely absent. Carcinoma is usually fatal before this condition occurs. There is coincident diminution in the amount of the ferments, pepsin and lab, secreted; but these latter do not entirely disappear, as is the case in glandular atrophy, succeeding a chronic gastritis, and in neurotic suppression of secretion.

Lactic acid commonly abounds in carcinoma stenosing the pylorus, with absence of free HCl and the presence of decided delay in the passage of food into the bowel. The greater the degree of

stagnation of the ingesta, the more pronounced the lactic-acid production. To distinguish with absolute certainty lactic-acid production from that derived from the food, proceed as follows: Wash the stomach thoroughly with warm water until all traces of food have disappeared. Administer a pint of moderately-thick gruel made from fine oatmeal, with the addition only of salt. Eight to ten or more hours later (the period of removal depending upon the degree of stagnation) the patient being at rest in bed and no food or drink having been taken in the interval, the gastric contents are aspirated or expressed. The filtrate, if clear, is now directly tested. If it be colored, instead, exhaust 30 to 60 cubic centimetres with five times its volume of ether, and test the aqueous extract of the ethereal residue. Five to 10 cubic centimetres of an aqueous solution of ferric chloride, so dilute as to be almost colorless, is placed in a test-tube, and a few drops of the filtrate added. The faint-yellowish color of the iron solution assumes a deep-canary yellow in the presence of lactic acid. A less delicate and less reliable test is Uffelmann's carbolated-ferric-chloride solution (a dilute solution of ferric chloride containing a few drops of a 5-per-cent. solution of carbolic acid). The violet hue of this is also changed to a canary yellow. (For a detailed account of the various methods of examination of the stomach-contents, see a paper by the writer, *Medical News*, Feb. 18, '93, a reprint of which will be sent on application.)

With the presence of large amounts of lactic acid, pyrosis is often a common symptom.

As the case progresses, the presence in the vomit (or in the removed stomach-contents) of altered blood, rather than that of bright red, appears. The blood,

because of its rather long sojourn in the stomach and mode of appearance (not as a frank hæmorrhage as is usual in ulcer), is apt to be of grumous, brownish-black or coffee-ground appearance, and will distinctly color the vomit or the contents removed by the tube. Unlike as in ulcer, large hæmorrhages are infrequent, but the vomiting, or the presence in the removed contents, of altered blood is common. Occurring also, unlike as in ulcer, the intervals between the hæmorrhages or a small series of them are slight if at all apparent.

Anorexia is usually a marked symptom. Occasionally the appetite remains remarkably good. The tongue is much like that seen in chronic gastritis, rather thickly coated, especially in the morning. The bowels are usually much constipated, especially when a high grade of pyloric stenosis and vomiting occur. The urine is more or less scanty and high colored, and of relatively specific gravity. It shows deficiency in the chlorides. There may be an increase in the amount of nitrogenous output. Indican is increased in amount, and acetone and diacetic acid may be encountered.

A tumor is frequently met with in carcinoma involving the pylorus when the case first comes under observation. It should always be painstakingly and persistently sought for. In examination the abdomen must be relaxed and palpation made under full inspirations. Air-distension of the stomach, to bring the pylorus below the edge of the liver, may be necessary to disclose the presence of tumor. Its employment should never be omitted. A tumor of the lesser curvature, palpable in the presence of a dropped stomach, tends to disappear on air-inflation. The tumor commonly has a firm feel and is painful to palpation. Evident tumor may, of course, be absent;

because of this we cannot exclude carcinoma. Simple hypertrophy of the pylorus and persistent reflex cramp simulate tumor. Such cases are on record, and the writer has seen several incidents of them. Fæces in the colon should not be allowed to mislead, the bowel being first thoroughly cleansed by repeated irrigation before a decision is reached. It should be remembered that pyloric tumors are not influenced by respiration unless adherent to the liver, and that without adhesions to adjacent parts the position of the tumor may be much lower in the abdomen than is the normal pylorus.

In carcinoma of the cardia there is increasing and persistent dysphagia and a sensation as if a foreign body were present in the region of the cardia, especially after the ingesting of food and drink. Regurgitation of solid food immediately after it is swallowed is usual. Retching and vomiting are common, the vomited matter consisting of mucus and but little or no food, save when a diverticulum has formed into which the food passes. Emaciation and debility are more rapid than in cancer of other parts of the stomach, but marked cachexia is usually absent. Hiccough is often present associated with retching. Pain, when present, is situated behind or near the xiphoid appendix. There may be retraction of the epigastrium. An obstruction at the depth of sixteen to seventeen inches from the incisor teeth is encountered in the attempt to pass the stomach-tube or œsophageal bougie. On the extremity of the tube after removal there is apt to be blood-stained mucus, and the lateral eye of the tube is apt to contain food-elements, blood, and mucus, and even a bit of the growth.

Diagnosis.—The diagnosis is usually a matter of little difficulty in the pres-

ence of the various symptoms already detailed, such as nausea and vomiting; the characteristic (small and frequent and grumous in appearance) gastric hæmorrhage; the emaciation, debility, and anæmia; increasing cachexia; the presence of tumor; the absence of free HCl in the stomach-contents, with the presence of lactic-acid formation. The diseases with which carcinoma is oftenest confused are ulcer, chronic gastritis, benign stenosis with dilatation, and a profound gastric neurosis. A separation is commonly easily made except in the cases of carcinoma ingrafted on ulcer. But here the further progress of the case; the lack of persistent improvement under treatment usually invariably curable in ulcer; the presence, more or less persistently, of blood or altered blood in the removed contents or in the vomit, and the increasing cachexia and anæmia tend to indicate the existence of ingrafted carcinoma.

Etiology.—Carcinoma of the stomach is a common disease and of more frequent occurrence in this country than in Europe. Next to the uterus, the stomach is the most usual seat of primary cancer; secondary cancer, also, though rarely, occurs here. It is a trifle more frequent in men than in women. Seventy-five per cent. of all cases occur between the fortieth and sixtieth years; 21 per cent. between the sixtieth and seventieth years; over 13 per cent. between the thirtieth and fortieth years, and nearly 3 per cent. between the twentieth and thirtieth years. Heredity, chronic gastritis, chronic ulcer, and traumatism of the stomach are factors of varying importance in etiology.

Pathology.—The most commonly noted varieties in their order of frequency are: (a) cylindrical-cell cancer, or epithelioma; (b) the soft-glandular, or medullary, cancer; (c) the hard-glandu-

lar, or scirrhus, carcinoma; (*d*) the mucous, or colloid, carcinoma. Many gradations exist between these types. The scirrhus has the most chronic course, and the medullary the greatest tendency to ulceration, degeneration, and to give rise to metastases.

Situation.—Welsh's statistics show that 60.8 per cent. occupied the pyloric region; 11.4 per cent. the lesser curvature; 8 per cent. the cardia; 5.2 per cent. the posterior wall; 4.7 per cent. the whole or the greater part of the stomach; 2.6 per cent. the greater curvature; 2.3 per cent. the anterior wall; 1.5 per cent. the fundus; 3.5 per cent. were multiple growths.

When in the pyloric region a tendency to girdle this orifice is early shown, causing the ensuing stenosis so commonly met with in gastric cancer; when occupying the body of the stomach the growth is usually limited to but a portion of its circumference.

The cylindrical-celled epithelioma has a firmer consistence than the medullary, although, like the last, it has a nodular formation, and shows on its surface fungoid elevations, from which hæmorrhagic extravasations are frequent. Sections of it display an abundant stroma, in which are contained tubular spaces filled with columnar epithelium. Ulceration is common, but not nearly so frequent as in the medullary variety. The most frequent seat of the cylindrical-celled cancer is, as of the scirrhus variety, the pyloric region close to the valve.

The medullary cancer grows in soft, nodular masses, following the course of the lymphatics and involving all the coats of the stomach. It shows a tendency to early extensive ulceration. It has a scanty stroma, in which are inclosed alveoli containing irregular cylindrical and polyhedral cells. The medullary cancer

has no common seat, although its predilection, like that of the other varieties, is for the pyloric region.

The scirrhus variety, as its name indicates, is of characteristic firmness, due to the abundance of stroma and the small amount of alveolar tissue. No tumor-nodules proceed from its growth, but merely dense thickening of the infiltrated stomach-wall. It affects almost exclusively the pylorus, which it stenoses, converting the latter into a rigid, tubular ring. Its surface tends to show flat ulcerations.

The colloid or alveolar cancer shows large alveoli distended with translucent colloid material. It had a tendency to widely involve all the stomach-coats, to spread to other parts, and may form colloid metastases in other organs. It shows no marked inclination toward ulceration.

Various distortions may occur in the stomach as the result of the growth of the cancer, involving one or the other of the orifices, the body of the stomach, or through formation of adhesions to adjacent organs. There may be atrophy of the stomach when the cardia is involved; massive or, occasionally, no dilatation, with involvement of the pylorus; or a greatly thickened or contracted stomach, with affection of its body.

Metastatic cancerous growths are very common, occurring in the adjacent abdominal lymphatics (but also in the axillary, cervical, and the inguinal glands), the liver, the peritoneum, omentum, intestine, pancreas, pleura, lung, and less frequently in other organs and parts.

With extensive ulceration, which occurs especially in the medullary cancer, a tendency to perforation of the stomach-wall, as in simple ulcer, exists. Among other micro-organisms, more or less constantly found on the surface of the carcinoma, the so-called Oppler-Boas bacil-

lus has, in the past few years, excited some attention. It is an unusually-long and non-motile organism, with one end narrow and the other thick. It is a lactic-acid producer, but is not pathognomonic of carcinoma. It occurs in carcinoma involving the pylorus, and has been found in benign pyloric stenosis, when dilatation and coincident stagnation of food is present, with absence in the secretion of free HCl.

In the course of cancer of the stomach there occurs an interstitial gastritis with granular degeneration of the gland-cells and subsequent atrophy of the mucosa; in consequence of this there is, from usually an early period in the disease, a diminution in the secretion of HCl and of the ferments, and in the latest stage of the malady HCl no longer occurs in recognizable amounts, and the ferments are present only in traces.

Treatment.—The treatment of cancer of the stomach is, of course, merely palliative. However early recognized, its cure is impossible. In the future, with more exact diagnostic methods, its early recognition, before debility and cachexia and the occurrence of metastasis render a radical operation futile, may permit excision of the growth to be sometimes of avail.

Life may be prolonged by the use of lavage and a suitable diet. Lavage is of the utmost utility in obviating the effects of autointoxication, in relieving stagnation occurring in the stomach-contents, and thus improving the condition of the motor function and holding somewhat in check the coincident gastritis. Under its influence intelligently carried out, symptomatic improvement is sometimes remarkable, though unfortunately nearly always short-lived. If lavage can be suitably carried out (as is outlined under the treatment of dilatation), it

should never be omitted from the treatment.

The diet is practically that already given in the treatment of dilatation of the stomach, but carbohydrates and fats must be more liberally permitted. With preserved motility, far less restriction as to these substances is necessary, and, indeed, whatever is desired in the way of wholesome food, if it does not tend to create nausea and vomiting, may be allowed. If butter is well borne, it, as well as olive-oil, is permitted, because of the high caloric value of fats. Concentrated nutriment (finely-scraped beef, somatose, sanose, whipped eggs) and predigested foods are usually essential with marked involvement of the pylorus and resulting stagnation in the stomach. More license in the choice of food is permitted when lavage is systematically employed. The use of a papain and a diastasic preparation is advisable when predigested food is not given. (See the treatment of dilatation.)

Carbonated drinks are inadvisable, although champagne is often well borne. If stimulants are constantly indicated, well-diluted whisky is the best, but a good claret, or Burgundy if it agree, may be allowed.

With the occurrence of frequent vomiting, not checked by the use of lavage, a diet for the time limited to peptonized milk-gruel, iced Mellin's food, expressed meat-juice, or koumyss, much as is recommended in the treatment of ulcer, must be employed.

For the relief of gastric pain, should codeine, hydrocyanic acid, and bismuth not be of avail, morphine, or the deodorized tincture of opium, should be unhesitatingly employed. For the relief of the impaired motility and the accompanying gastritis, besides the employment of the most essential lavage, certain

stomachics, the chief of which here is condurango, are of service. Condurango has been found of such usefulness in gastric carcinoma that once claims of a specific effect were made for it. Pain and vomiting seem sometimes to be lessened by it and appetite promoted. The original formula of Friedreich's was: macerate $\frac{1}{2}$ ounce of condurango-bark for twelve hours in 13 ounces of water; subsequently evaporate by boiling to half this quantity. Strain and administer $\frac{1}{2}$ ounce three times a day. A fluid extract of condurango may be employed in doses of 20 minims. To the condurango the following may be added, useful in all cases attended with atony and diminished gastric secretions:—

R Dilute hydrochloric acid, 10 to 15 minims.

Dilute hydrocyanic acid, 1 to 2 minims.

Tincture of nux vomica, 3 to 10 minims.

Spirit of chloroform, 5 to 10 minims.

Tincture of orange, 20 minims.

Fermentation occurring in the stomach-contents is usually obviated by lavage with antifermentatives, such as sodium sulphite, betanaphthol, boric acid, thymol, etc., used in dilute solution. With the presence of organic acids in any amount, occasioning pyrosis and other symptoms of fermentation, antacids, such as sodium and calcium carbonate, and magnesium carbonate, or dried magnesia, may be given, combined with charcoal, betanaphthol, menthol, etc. A drop or two of oil of cajuput, or a portion of a minim of oil of peppermint or anise, may be added to each powder.

Constipation is relieved by the use of lavage, and one of the vegetable laxatives, such as cascara, rhubarb, or aloes (aloin),

mentioned under chronic gastritis and under dilatation. For the anæmia, an iron preparation, preferably the albuminate or peptonate, or the saccharated carbonate (in dose of a small teaspoonful three times daily), or arsenic (the acid or the alkaline solution) may be given.

Gastroptosis.

Synonyms.—Enteroptosis; nephroptosis; Glénard's disease.

In this disorder there occurs a downward displacement of the stomach and of the right kidney and perhaps one or all of the other abdominal viscera. Glénard's disease is a common affection in women, and not infrequently is encountered in spare, ill-nourished men. The causes are various: tight lacing; child-bearing; debilitating diseases, etc. So many cases are encountered in young women who have neither laced nor borne children that other causes little understood must be operable. The disease may be symptomless, as I have noted in a number of cases, but commonly various general (neurasthenic) and local (dyspeptic) symptoms occur. The diagnosis is the recognition of the usually combined condition: gastroptosis and nephroptosis. The loose right kidney is usually easily grasped in these subjects by bimanual palpation, the patient semi-recumbent or recumbent, with head and shoulders supported by a pillow and knees semiflexed. The patient is directed to maintain a condition of relaxation of the abdominal wall and to take a full inspiration. Toward the end of the inspiratory act the kidney can usually be easily grasped and held between the two hands. The left kidney, less frequently loose, can be similarly palpated. The dropped stomach is recognized by the measures outlined in the symptoms and diagnosis of dilatation. Air-inflation and the use of

the gastroduodenal tend to readily establish the diagnosis of dropped stomach.

Treatment.—This consists in development of the flabby abdominal muscles and conversion of the condition of negative intra-abdominal pressure into that of a positive one, in order to obtain natural support for the prolapsed organs. The intelligent use of graduated exercises, with or without apparatus, is most important in this particular. The use of a cushion-pad or bandage, if such is practicable, sometimes tends to relieve symptoms.

Attention should be directly paid to the digestive symptoms: Removal of constipation and gastric atony; regulated wholesome diet, such as will not only agree with the stomach, but enable flesh to be gained. Intra-gastric and percutaneous faradism is of value.

Functional Diseases of the Stomach and the Gastric Neuroses.

There is a large class of gastric disorders which must still be regarded as functional, and which are commonly grouped, collectively, among the gastric neuroses. Most of these affections are without present discernible minute anatomical alteration. Their existence seems to be dependent upon a strong neurotic taint, and to have had origin as a part of a general or local pronounced neurasthenic state.

Certain affections classed with the neuroses, such as hyperchlorhydria and continuous absence of the gastric secretory function (achylia gastrica), stand on the border-line, as it were, between the functional and organic diseases of the stomach. In a large number of cases of hyperchlorhydria there exists a proliferation of the acid-secreting cells, or of the gland-cells as a whole, and in a large number of cases of achylia gastrica now on record without preceding history of either

a neurosis or suggestive of gastritis, the indications are that actual atrophy of the mucosa exists, probably as a result of a latent glandular gastritis. These, and especially the last named, have no place among the neuroses, although commonly considered with them.

The neuroses of the stomach are conveniently grouped into the sensory, the secretory, and the motor. The following convenient classification is practically that adopted by Boas:—

SENSORY NEUROSES.—Hyperæsthesia; anæsthesia; gastralgia; gastralgokenosis; bulimia, or hyperorexia; polyphagia; acoria; anorexia.

SECRETORY NEUROSES.—Superacidity, or hyperchlorhydria; gastrochylorrhœa (gastrosuccorrhœa periodica and continua chronica); subacidity, or hypochylia; achylia gastrica, or in acidity.

MOTOR NEUROSES.—Hypermotility (peristaltic unrest of the stomach); atony, or amotility; rumination (merycism) and regurgitation; cardiospasm; incontinence of the pylorus; pylorospasm; nervous eructations; pneumatosis; nervous vomiting.

Sensory Neuroses.—**GASTRIC HYPER-ÆSTHESIA** is an increased irritability of the sensory gastric nerves. In presence of normal gastric secretion and motility, or these deranged in minor degree, there occur attacks lasting days or months, in which distress is experienced after all food and often after water, if taken save in the smallest quantity. Gastralgia, allied to gastric hyperæsthesia, as is cutaneous hyperæsthesia allied to actual neuralgic pain, may co-exist. This affection occurs in neurotics often without assignable cause, or it may exist as a consequence of constitutional states, such as chlorosis. Excesses in venery or alcohol predispose.

Treatment.—The underlying cause

must be especially aimed at and the general bodily nutrition, if below par, raised. Any article of diet that seems at fault must be forbidden. Silver, alumnol, and bismuth, locally, as suggested in the treatment of ulcer, are of value. The bismuth should be employed in a smaller dose, and combined with codeine and perhaps cocaine and dilute hydrocyanic acid, as in the treatment of the pain of gastric ulcer. If gastric motility is good and hypersecretion does not exist, the silver may be administered by the mouth in solution in a dose of $\frac{1}{8}$ grain, diluted with water, fifteen minutes before meals. Courses of strontium bromide and arsenic are of special service in the highly neurotic, as are asafoetida and valerian. Local applications, such as a Preissnitz bandage, constantly worn by day, is most useful, as are general hydropathic measures. The rest-cure may be demanded with the local and general treatment.

The reverse condition to the above, more or less ANÆSTHESIA of the gastric mucosa, may exist as a neurosis; so that there is little appreciation of satiety after meals, or no sensations of discomfort after the ingestion of substances that ordinarily would excite gastric uneasiness, such as those of extremes of temperature, and overseasoned food. The most nauseous drug can be taken by certain of these cases without the usual effect.

GASTRALGIA—In this affection attacks of severe paroxysmal epigastric pain occur which radiate over the abdomen and through into the back. Attacks occur either by day or by night, and often show a curious periodicity. In the simple variety (not dependent upon ulcer, gastrosuccorrhœa, or pylorospasm) it is either independent of food or the pain may be relieved by eating or by drinking a hot liquid. Vomiting is not usual un-

less the gastralgia accompanies ulcer or is associated with and caused by pylorospasm and gastrosuccorrhœa. Gastralgia may occur solely as the local manifestation of a neurosis: or as an accompaniment of gastric ulcer, cancer, or a motor or secretory neurosis, such as pylorospasm, cardiospasm, gastrosuccorrhœa; or it may have a central cause in early or advanced tabes.

Treatment.—The treatment of this affection is on lines laid down under the management of gastric hyperæsthesia, the paroxysm being treated similarly as are the pains occurring in ulcer: Sinapisms, or turpentine stupe externally, and morphine hypodermically (guardedly resorted to in attacks occurring frequently) in the more severe paroxysms. In the intervals, or in mild seizures, hydrocyanic acid, cocaine, and codeine, with bismuth or with cerium oxalate, should be given on the empty stomach.

The following combination is useful in mild attacks:—

- R Oil of cajuput, 1 to 4 minims.
- Spirit of chloroform, 10 to 20 minims.
- Aromatic spirit of ammonia, 10 to 20 minims.
- Tincture of valerian, 10 to 20 minims.
- Compound spirit of lavender, to 2 drachms.—M.

This represents one dose, to be taken in water at intervals of a half-hour.

The use of silver nitrate as directed in ulcer and in hyperchlorhydria should be tried. If the last-named affection co-exists, antacids are necessary.

GASTRALGOKENOSIS.—This title is used by Boas to describe a condition in which sensations of most disagreeable or even painful emptiness occur one to two hours after meals and continue for from

a quarter to a half-hour and are not associated with bulimia. The ingestion of food relieves the distress as in typical hyperchlorhydria. Hemmeter rightly suggests that this affection is a mingling of gastric hyperæsthesia, hypermotility, and of HCl excess.

BULIMIA (HYPEROREXIA, OR CYNOREXIA).—Bulimia occurs as a simple neurosis or in association with other local gastric (ulcer; HCl excess), intestinal (tape-worm), or general condition, such as hypermotility, the various psychoses, brain-tumor, etc. The affection may be periodical and of sudden onset, with short or long intervals of freedom, or exist as a chronic condition. The seizure is characterized by sudden oncoming, intense, gnawing, distressing hunger, from which, if not immediately satisfied, there results sensations of terror or of impending danger, and curious nervous phenomena, such as prostration of strength, headache, tinnitus, cardiac palpitation, pallor, or even fainting. Small quantities of food may readily satisfy hunger and dispel these symptoms, or an enormous amount may be required. A large number of meals is often eaten in a day. Bulimia may alternate with anorexia.

ACORIA.—Acoria is that condition in which perhaps without primary hunger, there is absence of the sensation of satiety, although enormous quantities of food may be eaten. It is dependent upon the same causes as bulimia. There may be a transition between the two affections.

NERVOUS ANOREXIA.—In this neurosis both appetite and the sensation of hunger is completely and permanently absent and an absolute aversion for all food may exist. The patient becomes greatly emaciated; so that her appearance suggests a wasting disease, such as tuberculosis pulmonum.

The treatment consists in searching for and removing the underlying cause; vegetable bitters should be given, such as *nux vomica* or strychnine, condurango, etc. Hydrochloric acid is of service in combination with these. Orexin (basic) or the tannate, commonly recommended, is not of much value in promoting appetite in these cases. Forced feeding may be required, as may the so-called Weir Mitchell rest-cure.

Secretory Neuroses.—**HYPERCHLORHYDRIA (HYPERCHYLIA; SUPERACIDITY).**—Hyperchlorhydria is a condition characterized by an increase in the percentage of the secreted HCl and of the ferments in the gastric juice. It may be associated with a much-increased flow of gastric juice, the percentage of HCl and of the ferments remaining normal. It occurs (*a*) as a pure neurosis without anatomical alterations in the gastric tubules; (*b*) as a result of a decided increase in number of the acid- and ferment- secretory cells,—a proliferation of the glandular elements and especially of the acid-secreting cells; (*c*) as a form of gastritis (gastritis *acida*). As a pure neurosis its occurrence is not constant, and periods are not infrequent in which subacidity or inacidity alternate with it. In class *b* the hyperchlorhydria is more constant. In class *c* the total acidity of the gastric filtrate, though heightened by an increased percentage of HCl, is also augmented by the presence of a fair or considerable amount of the acids of fermentation.

In hyperchlorhydria free HCl appears earlier than normal in the process of digestion and exists in an increased percentage throughout the digestive phase. The acidity of the gastric filtrate at the height of digestion of various trial meals is upward of 0.4 to 0.7 per cent., instead of the usual 0.15 to 0.2 per cent. The

digestion of proteids is very active, and that of carbohydrates greatly interfered with. Hyperchlorhydria is a very common affection, forming a high percentage of the cases of the various forms of indigestion that one is called upon to treat. It is common in neurotic subjects, and its development can often be traced to nervous strain, worry, or fatigue.

Symptoms.—Briefly, there is more or less gastric distress, uneasiness, or diffuse pain occurring at a variable time after meals (one to three or four hours), at a period when saturation of the albuminoids and salts of the ingesta has occurred and a considerable excess of HCl over that necessary for this purpose becomes evident. There is often an accompanying sensation of burning in the epigastrium (heart-burn), and pyrosis is common. These symptoms are quickly dissipated by the ingestion of food or by a full dose of antacid.

The appetite is well preserved; the bowels may be constipated, especially if intestinal indigestion is present. This last often occurs in consequence of the ill effect of the high percentage of HCl on the pancreatic secretion. Both gastric and intestinal amylolysis are interfered with.

There may be diffuse tenderness in the epigastrium, largely through the gastric hyperæsthesia accompanying. The gastric motility may be normal, increased, or diminished. Hypermotility (too rapid passage of the ingesta into the bowel) is more common than atony; the latter, though, is not unusual.

Diagnosis.—This affection is differentiated from ulcer chiefly by the fact that the disagreeable sensations, or pain, in the former are almost invariably dissipated by the taking of food or a full dose of an antacid. Other differential points are the absence of all, save occa-

sional, vomiting, of hæmatemesis, of localized pain, and of chloranæmia.

Treatment.—The medical treatment is largely that of gastric ulcer: the free use of antacids three to four hours after a meal (the dose graded by the percentage of HCl excess, ascertained by several examinations of the stomach-contents), and the local use of silver, alumnol, and of moderate doses of bismuth. Most important is removal of any apparent underlying cause, improvement of the general health, and an out-of-door life. The amount of carbohydrates in the food must be restricted, as must the intake of table-salt. When carbohydrates are eaten, diastase should be coincidently taken. Then, too, chewing gum for a half-hour after a meal is often of value. Nervines—such as arsenic, asafoetida, valerian, and sumbul, in neurotic cases—and nerve-sedatives—such as the bromides, and especially strontium bromide—are often indicated.

GASTROSUCCORRHŒA PERIODICA (PERIODICAL EXCESSIVE SECRETION OF GASTRIC JUICE; GASTROXYNSIS).—In this affection periodical attacks of excessive gastric secretion occur independently of the stimulus of food, and are associated with gastric distress, pain, nausea, and vomiting. The pain may have origin at the site of the pylorus or the cardia, thence radiating, or it may exist primarily as a diffuse gastralgia. The attack lasts from a few hours to several days, and occurs at intervals of days, weeks, or months, during which no gastric symptoms may be evident and no abnormality of the gastric functions exist. The attacks are sometimes associated with typical migraine.

The affection occurs as a primary neurosis, or is dependent upon a central organic nervous disease, such as tabes.

Treatment.—As in the other gastric

neuroses, the treatment essentially consists in building up the general health and in aiming at the eradication of the neurotic element present. If hyperchlorhydria exists in the interval, appropriate treatment for it is necessary. At the onset of an attack lavage with hot soda solution is advisable. By it, repeated at intervals, an attack may be aborted. If it cannot be employed, the induction of vomiting by drinking hot water containing sodium bicarbonate is often of service. Otherwise the treatment of the paroxysm is similar to that of gastralgia. During and shortly after the seizure the diet must be of the blandest sort, similar, indeed, to that suggested in ulcer subsequent to bowel-feeding.

GASTROSUCCORRHŒA CONTINUA CHRONICA (CHRONIC CONTINUOUS FLOW OF GASTRIC JUICE; REICHMANN'S DISEASE).—This is an affection in which the stomach, even during the fasting state, is never free from a considerable quantity of gastric juice, due to its constant excessive secretion. This affection is rare as a primary neurosis, although the writer has seen several undoubted cases. In most of the observed cases there co-exists benign pyloric stenosis (often due to hyperplasia), and consequent dilatation of the stomach.

Latent ulcer has also been noted with this affection. There is always a considerable quantity of gastric secretion in the fasting stomach in the morning. This macroscopically may not show evidence of food-elements, but, microscopically, starch-granules, etc., can commonly be made out. Sarcinæ are not evident unless with a considerable degree of atony. The disease may exist quite symptomless, with preserved health, or there may be present (as a result of marked gastric myasthenia) the usual indications of stenotic dilatation.

The symptoms accompanying this affection are largely those of hyperchlorhydria. With these, regurgitation or vomiting of a highly acid or normally acid gastric juice is common, and may be associated with more or less gastric uneasiness or even with attacks of gastralgia. The writer has under observation two cases in which attacks of typical pylorospasm occur. Symptoms indicative of a neurosis are usually evident. In cases in which there is pyloric stenosis and dilatation symptoms of these are usually evident. The treatment is that of the underlying neurosis plus that for hyperchlorhydria. The in-take of fluids must be limited, as in gastric dilatation.

SUBACIDITY OF THE GASTRIC JUICE, OR HYPOCHYLIA.—This is a condition occurring in neurotic or in neurasthenic subjects, in which, without indications of gastritis, there is secreted an abnormally small amount of HCl and of the ferments. The condition may alternate with periods in which hyperchlorhydria or even actual achlorhydria is present. Atony of the stomach not unusually accompanies subacidity of the gastric juice. The treatment consists in building up the general health, special treatment for the neurosis, and the use of diluted HCl after meals, in combination with strychnine, or with nux vomica, and with certain others of the vegetable bitters. Intra-gastric faradism and galvanism are of value, as is general electrical treatment for the neurosis.

TOTAL ABSENCE OF THE GASTRIC SECRETORY FUNCTION (ACHYLIA GASTRICA; ACHLORHYDRIA; NERVOUS ANACIDITY; ATROPHY OF THE GASTRIC TUBULES; ANADENIA VENTRICULI.—As remarked before, this curious affection, although classed among the neuroses and functional diseases of the stomach, is often dependent upon an actual atrophy

of the gastric tubules, which may have been due to a granular gastritis, symptoms of which last had not been evident. The writer has described this affection at length in the *Amer. Jour. of the Med. Sci.*, Nov., '95. The history of the cases he there details and that of certain others he has since observed renders it not improbable, as he there holds, that many cases of this affection originate as a local exhibition of a general neurosis or as a general neurasthenia, or through some process of nervous inhibition. Through a long-continued action of the causative factor, the suppression of function leads finally to atrophy of the non-secreting glands, without the existence of a preceding or accompanying gastritis. It is, however, important to note that in a number of cases studied by Hemmeter, from which he was able to obtain fragments of the gastric mucosa, in nearly all glandular gastritis was evident with the glandular atrophy.

In cases of absence of the secretory function the acidity of the gastric contents is persistently practically *nil*, being merely that of the food previously ingested, macerated in the fluid coincidentally taken. The gastric contents for purposes of testing must be removed by the tube at a time after a meal when digestion should normally be at its height and a fair amount of free HCl evident. The acidity of the filtrate then, after the simple meal of bread and water (2 ounces of bread; 12 ounces of water),—the contents removed in one hour from its ingestion,—is from 4 to 8, instead of from 30 to 60, as calculated on 100 cubic centimetres of the gastric filtrate, a measured amount of which is titrated with decinormal sodium hydrate. Pepsin and lab-ferments are absent, but traces of the pro-ferments are usually evident. (For detail of methods of examination, see the

writer's paper on this subject referred to.)

This disease may exist quite symptomless and with preserved general health, or there may be present (as a result of a coincident marked atony of the stomach) anæmia and dyspeptic symptoms referable to the atony. Gastric carcinoma should be carefully searched for.

The treatment consists in endeavoring to restore the secretory loss, if it is suspected that atrophy of the tubules has not yet occurred. The use of the intragastric douche with weak solutions of HCl, and a bitter infusion, alternated with douches of soda and of salt; the daily employment of intragastric electricity, and of HCl before meals, all as detailed in the treatment of chronic gastritis, are then worthy of trial. If impairment of the motor function exists, this, at least, is benefited or removed by this treatment even if secretory loss cannot be restored through atrophy of the glandular elements. Attention to the general health is of prime importance; the accompanying neurasthenia or the manifestations of a neurosis must receive the most intelligent management.

Later, when persistent efforts to restore the secretory function are resultless, the further use of HCl is unnecessary. Intragastric electricity is then employed, if at all, merely for its effects on motility. It is useless in any stage of this affection to administer HCl and pepsin, expecting to obtain a digestive effect. An active papain and diastasic preparation must be employed instead, or an extract of the pancreas used, if the indications, such as debility and blood-impoverty, suggest that digestion in the bowel by aid of the pancreatic secretion, is not occurring.

The Motor Neuroses. — **HYPERMOTILITY** is that condition in which the gastric motor function is abnormally increased,

the stomach-contents passing too rapidly onward into the bowel before gastric digestion has been completed. Hyperchlorhydria very commonly co-exists with hypermotility, and is presumed to originate the latter sometimes.

The treatment of hypermotility is largely that of hyperchlorhydria.

PERISTALTIC UNREST (KUSSMAUL); TORMINA VENTRICULI NERVOSA.—In this condition there is a markedly exaggerated condition of gastric peristalsis, which is not only subjectively evident to the patient as a disagreeable sensation in the epigastrium or actual pain, but which may often be evident to the examiner. Waves of peristalsis are then noted passing from left to right, and sometimes in a reverse direction. Tormina ventriculi is commonly associated with pyloric stenosis with gastric dilatation, but rarely it occurs as a pure neurosis without accompanying organic disease, and attacks of pylorospasm are coincident.

The treatment is that of the underlying affection plus that for gastric hyperæsthesia given.

NERVOUS ATONY OF THE STOMACH.—Atony of the stomach is technically a condition in which delay, more or less marked, in the passage of food into the bowel occurs, not dependent upon obstruction at or beyond the pylorus. The stomach still retains its normal size when empty, and food is rarely found in the fasting organ in the morning, some ten to twelve hours after its ingestion. Simple atony may occur as a pure neurosis, and as such is common in neurasthenics. It then is often but a transient affection, due directly to some pronounced mental disturbance. Atony of the stomach may be more or less constant as an accompaniment of certain debilitated constitutional states, such as general neurasthenia, tuberculosis of the lungs, simple anæmia,

etc. Atony of the stomach occurs both as a primary neurosis or as one secondary to other nervous affections of the stomach, such as pylorospasm and hyperchlorhydria. It is usual in gastropotosis.

Symptoms.—These are sensations of uneasiness, weight, and fullness in the epigastrium after meals; eructations of gas; perhaps headache; and a tendency to vertiginous attacks. Anorexia and usually constipation are present. A splash-sound is readily produced some hours after food or drink, even when but a small quantity of fluid is present in the stomach. Examination with the tube shows the presence of food some hours after the stomach should have emptied itself. (For further symptomatology see **DILATATION OF THE STOMACH.**)

The treatment is that of atonic dilatation (which see) plus that of the neurasthenia or underlying neurosis.

RUMINATION (MERYCISM).—This is a gastric neurosis characterized by habitual regurgitation of small quantities of food into the mouth for several hours after its ingestion, which regurgitated food is not expectorated, but rechewed and re-swallowed, all after the manner of the ruminant. The affection occurs in neurotic individuals, and is often preceded by a more or less long period in which nervous disturbances of digestion have occurred and simple regurgitation of food has been common. This disease, as with insufficiency of the cardia and with simple regurgitation, is presumed to be due to an increased irritability of the vagus nerve. The onward passage of food into the bowel may be normal or atony may exist; the secretory function may be in a state of exaltation or depression; no relation seems to exist between the motor and secretory functions and rumination.

Treatment must be directed to the underlying neurosis. Moral suasion, in

which insistence upon constant autosuppression of the regurgitation is urged, is most important. Hypnotic suggestion is always worthy of trial. Thorough preliminary mastication of food must be urged. The use of a pronounced bitter drug after meals, such as quinine, as suggested by Hemmeter, is worth a trial.

NERVOUS ERUCTATIONS.—This affection is common in neurasthenic and neuropathic individuals or in the otherwise robust after mental strain or worry. It exists either as an ephemeral or a chronic condition. Eye-strain may be a factor. The gas is paroxysmally expelled. It is tasteless and odorless, and may arise from the stomach or merely from the œsophagus, consisting of air that has just been swallowed.

PNEUMATOSIS is a condition allied to the foregoing in which, in consequence of spasmodic closure of the orifices of the stomach, this viscus becomes markedly and painfully distended with air. Dyspnoea and great subjective discomfort is thus produced.

Treatment of Nervous Belching and Pneumatosis.—The underlying neurosis or neurasthenia must receive attention. Among drugs the bromides, arsenic, and strychnine are of value. Boas favors the following in pill, three times daily:—

- R Extract of physostigma, $\frac{1}{10}$ grain.
 Extract of belladonna, $\frac{1}{5}$ grain.
 Strychnine sulphate, $\frac{1}{40}$ grain.—
 M.

Intragastric electricity is recommended, but the writer has had little success with it in his cases.

NERVOUS VOMITING may occur as an idiopathic condition, without primary gastric disorder or obvious reflex cause, then dependent upon a neuropathic condition; or it may have origin in a reflected disturbance, such as in disease of

the brain (meningitis, tumor, etc.); disease of the spinal cord (tabes, causing gastric crises); disease of the kidneys (vomiting of uræmia or that due to stone in the kidney), etc. The vomiting occurring in the early months of pregnancy is a well-recognized form of reflected gastric disturbance. Nervous vomiting is especially characterized by its occurrence independent of irritation of the stomach by food, and in one in whom previously the gastric functions may have been practically normal; by its precipitate onset, as in cerebral disease, without marked or any preliminary nausea.

Certain forms of nervous vomiting are described occurring in neuropaths, and not dependent upon obvious reflex cause, such as the periodical vomiting of Leyden and vomiting occurring in profoundly neurasthenic subjects. Nervous vomiting is common in hysteria. In the periodical vomiting (of Leyden), a somewhat rare affection, periodical attacks of violent vomiting occur at regular intervals and in an otherwise healthy subject. The duration of an attack is from one to fourteen days. It is attended with prostration and resembles in its general character the gastric crisis of tabes.

An important feature of idiopathic nervous vomiting, and especially of that form occurring in hysterical subjects, is that, although it may persist over a very long period, the bodily nutrition does not especially suffer. Commonly in these subjects but a portion of the gastric contents is ejected during the act of emesis.

The treatment of a seizure of nervous vomiting is similar to that of the vomiting of gastric ulcer. In the interval the underlying neurosis must receive careful attention.

CARDIOSPASM—cramp of the inferior extremity of the pylorus and of the cardiac extremity of the stomach—occurs as

a symptom of neurasthenia, hysteria, etc., and, as with pylorospasm, it is often symptomatic of certain nervous affections of the stomach, such as increased secretory activity, and increased sensibility of the mucous membrane (hyperæsthesia). Cardiospasm is observed in two forms: as a paroxysmal, transitory affection, lasting from a few hours to a day or two, and as a chronic ailment which may extend over a long period. The acute seizure resembles an attack of gastralgia save that the situation of the pain is in the region of the cardiac orifice, and thence extends into the back. There is attending gaseous distension of the stomach and dysphagia. In the chronic affection dysphagia is more or less constant, and may become habitual as time passes, coincident with dilatation of the lower end of the œsophagus. From this last a diverticulum ultimately results, much as is the case in organic stricture. The patient complains that the food does not enter the stomach. Regurgitation of unchanged food soon after its ingestion is then common. There is then absence of the second deglutition-murmur, normally heard immediately below the xiphoid appendix in a few seconds (2 to 10) after swallowing solids or liquids. From the chronic form of cardiospasm organic, malignant, and non-malignant stricture of the cardia must be separated. The treatment of cardiospasm is that of the underlying neurosis. In addition the systematic careful passage of a soft œsophageal bougie or the stomach-tube must be practiced. Thoracic aneurism must first be excluded.

PYLOROSPASM—spasm of the pyloric orifice of the stomach—is of less frequent occurrence than cardiospasm. Its existence has been questioned, but the writer has seen a number of undoubted instances. It occurs in neurotic, debili-

tated subjects, and is commonly associated with hyperchlorhydria, hyperæsthesia, and with simple atony or with dilatation of the stomach. Ulcer may be an exciting cause. In a case of undoubted pylorospasm recently under observation the symptoms, briefly, were: attacks of paroxysmal pain occurring a trifle below the right of the costal margin, at the junction of the eighth and ninth ribs, shooting thence through into the back and across the abdomen. Uneasiness and pain in the pyloric region lasting a half-hour or more would precede the paroxysmal pain. The attacks were induced by eating when overfatigued, and occurred nearly always between 12 and 3 in the morning. The patient was of spare build and of nervous temperament. He was neurasthenic, overworked, and was greatly given to worry. The attacks usually were of from one to two hours' duration. Vomiting only occurred if self-induced and then cut the attack short. Lavage with hot soda solution always had a similar, but more prompt, effect. The stomach-contents obtained by the tube during a seizure usually amounted to a litre (acute atony) and the acidity was high, equaling 0.3 to 0.35 free HCl (hyperchlorhydria with hypersecretion).

The treatment of pylorospasm is, as with the foregoing, attention to the underlying neurosis, and, coincidentally, treatment of the associated gastric affection. In cases associated with hyperchlorhydria and with hypersecretion, the local employment of silver, alumnol, and of bismuth, as detailed in the treatment of ulcer and of simple hyperchlorhydria, has been of extreme value in the writer's hands. The case mentioned was cured by this means.

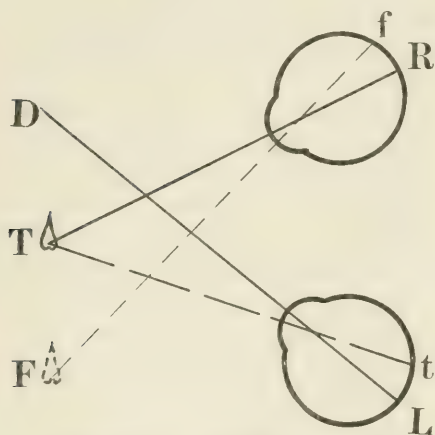
D. D. STEWART,
Philadelphia.

STRABISMUS.—From the Greek $\delta\tau\rho\alpha\beta\acute{\iota}\delta\mu\acute{o}\varsigma$, to squint.

Synonyms.—Squint; heterotropia.

Definition.—The condition in which both eyes do not look toward the same point; but when one eye fixes a certain point the other is turned elsewhere.

Symptoms.—The false position of the eye that is not turned toward the object looked at is usually noticed on casual inspection, and constitutes a very disagreeable deformity. This eye is called the *deviating eye*. The one which is normally directed is the *fixing eye*. The symptom of deformity may, however,



Strabismus. (Edward Jackson.)

prove misleading. The direction an eye is looking is judged by the direction the cornea is turned. In some eyes the visual axis pierces the cornea so far from its centre that the eye appears to deviate when in reality it is properly directed; and such an eye might really deviate when it appeared straight.

The lack of correspondence between the eyes prevents true binocular vision, if that function has already been developed; or prevents its development. If the patient has previously possessed normal binocular vision the deviation

causes diplopia or double vision. This diplopia is distinguished from monocular diplopia by the fact that the covering of either eye removes it.

The image seen by the fixing eye is called the "true image," it being referred to the true position of the object. The image seen by the deviating eye is called the "false image," it being referred, in the consciousness of the patient, to a direction different from the real direction of the object. The relation of this diplopia to the deviation of the eye may be understood from the illustration here given. The visual axis $R-T$ is properly directed toward T , the object looked at; but the other visual axis $L-D$ deviates toward D . In the eye L , therefore, the image of T falls at t , on the nasal or inner portion of the retina; and it is referred or projected in the direction $f-F$ as another object at F , the point f in the fixing eye corresponding to the point t in the deviating eye.

The direction of the false image is always the opposite of the direction in which the eye deviates. Thus, when the eye deviates upward the false image appears below. When the eyes are crossed we have *homonymous diplopia*; and, when the eyes diverge, *crossed diplopia*.

Diplopia disappears when the strabismus is corrected, or when one eye is closed. It may also disappear through extreme deviation, causing the image in the deviating eye to fall on the extreme periphery of the retina, which is comparatively insensitive. Or it may disappear from habitually disregarding the false image, especially in early life. While, therefore, the presence of binocular diplopia proves the presence of strabismus, its absence does not prove that the eyes are properly directed.

Etiology.—The normal directing of the eyes depends on an extremely deli-

cate system of reflex actions, which requires sufficiently good vision in both eyes and a central co-ordinating mechanism. The power of accurately co-ordinating the eye movements normally develops after birth. Arrest in its development may cause strabismus. Practical blindness of one eye, especially when it depends on some lesion of the cornea that causes distortion of the retinal images or the diffusion of unfocused light within the eye, is very likely to cause that eye to deviate.

Errors of refraction are a common cause of strabismus. Hyperopia of rather high degree, 2 D. or upward, compels excessive effort of accommodation, and so brings about excessive convergence. Myopia of very high degree, 10 D. or more, is attended with elongation of the eyeball that makes it difficult to turn it in its socket. This leads to divergent squint through giving up of the effort to turn the eyes in, so strongly as would be necessary to fix both eyes upon an object so close to them. Difference of refraction between the two eyes, making it difficult or impossible for both to focus the object at the same time, also causes strabismus. Paralysis of one or more of the muscles that turn the eye disables it for certain movements and so causes strabismus. More rarely spasm of one or more of these muscles is the cause of a deviation.

Strabismus from lack of development of the co-ordinating mechanism, hyperopia, or difference of refraction between the two eyes develops in early childhood, when it is also most likely to arise from practical blindness of one eye. From myopia it occurs a few years later, as the myopia usually develops during the period of school-life. From paralysis of the muscles it may develop at any time of life. Syphilis and rheumatism are

the most common causes of these palsies. But acute infectious diseases, especially diphtheria, injuries, and chronic diseases—as diabetes and Bright's disease—also cause them. Spasm of the muscles is apt to be hysterical.

Literature of '97-'98-'99.

The onset of convergent strabismus during the wearing of a bandage for injury or disease in childhood, or during any affection which temporarily prevents binocular vision, is not uncommonly observed. F. W. Marlow (Ophthalmic Record, p. 117, '97).

Varieties.—When strabismus is due to paralysis of certain muscles, causing inability to move the eye in certain directions, it is called *paralytic*. Where the squint is due, not to inability to move the eye, but to a false co-ordination of the movements, so that while the two eyes move freely in all directions they still keep their false relation to each other (as always too convergent or too divergent, or one turned too high for the other) the condition is called *concomitant* or *comitant strabismus*.

When the eyes converge too much it is *internal* or *convergent strabismus*. When they diverge, or do not converge enough for near seeing it is *external* or *divergent strabismus*. When one eye turns higher than the other it is *vertical strabismus*. When it is always the same eye that deviates it is *monocular* or *monolateral strabismus*. When it is sometimes one eye, sometimes the other, that deviates, it is *alternating strabismus*. When a comitant deviation is always present, it is called *constant*, although it may vary much in degree; if sometimes absent it is called *intermittent* or *periodic*.

Paralytic strabismus only appears when the affected muscles are called on to perform their function. It is divided

into varieties corresponding to the muscles affected, and usually spoken of as paralysees of those muscles; as paralysis of the internal rectus, paralysis of the inferior oblique. Paralysis of all the muscles supplied by a certain nerve-trunk may also be designated, according to the nerve affected, as *abducens paralysis*, *oculomotor paralysis*, *fourth-nerve paralysis*. Paralysis of all the extra-ocular muscles, *ophthalmoplegia externa*, causes some kind of squint whenever an attempt is made to look out of the direction in which the affected eye is turned. If both eyes are affected the strabismus is usually constant.

Latent strabismus, also called *heterophoria*, *muscular insufficiency*, or *imbalance*, or *dynamic squint*, is that condition in which a tendency to strabismus exists but is overcome by a special effort of the appropriate muscles, in order to avoid diplopia and preserve binocular vision. The insufficiency may be of any one or more of the muscles, shown only or chiefly when the particular muscle is called into action: a sort of lateral paralytic strabismus. Or it may be found to be about the same, whatever the direction in which the eyes are turned, a latent comitant strabismus. To the latter variety the term *heterophoria* (from the Greek ἑτεροφωρῆ, different, and φωρῶς, tending) may be applied. The varieties of heterophoria are *esophoria*, tending inward, latent convergent strabismus; *exophoria*, tending outward, latent divergent strabismus; and *hyperphoria*, tending upward, or latent vertical strabismus. The latter may be right or left according to the eye which tends to turn above its fellow. *Orthophoria*, right tending, or muscular balance, is the normal condition, the absence of heterophoria.

Diagnosis.—In a case of apparent

strabismus we must first determine whether the apparent deviation is real. This is done by having the patient fix his gaze steadily upon some distant object: and then, while watching his eyes, covering first one and then the other, so that he is compelled to fix with them alternately. He will fix with the uncovered eye. Then on shifting the cover, if the other eye was also properly directed while it was covered, no movement will occur. But if the covered eye was deviating, it will have to move in order to fix the point looked at, and the eye which previously fixed will deviate; and these movements will be repeated every time the cover is shifted. The extent of such movements indicates the amount of the deviation, and the direction shows the variety of strabismus.

The degree of lateral squint may be measured along the lower lid in millimetres of change in the direction of the eye from the deviating to the fixing position. But it is more accurately measured by the angle of deviation. This may be ascertained by placing the deviating eye at the centre of the arc of a perimeter, and directing the gaze toward a distant point in the axis of that arc. Then finding the point of the arc toward which the deviating eye is turned, we read off the angle of deviation. The point toward which the deviating eye is turned is ascertained by moving a candle-flame along the arc, until the surgeon's eye behind the flame sees its reflection in the centre of the pupil of the deviating eye. Priestley Smith's method is applicable without a perimeter. In it the surgeon reflects light on the deviating eye with a mirror held at his own eye one metre from the patient, and has the patient look at his finger, which is moved at a distance of one metre from the deviating eye until the corneal reflex from that eye appears

at the centre of the pupil. The distance from the surgeon's eye to his finger is then the measure of the strabismus. It may be measured on a scale of tangents showing the degrees of squint, or each centimetre corresponds to about one centrad or four-sevenths of a degree. When there is diplopia the amount of squint may also be measured by the distance of the false image from the true image, or the strength of the prism required to bring them together.

To discriminate between paralytic and comitant strabismus, we must note if the deviation of the squinting eye or the separation of the true and false images is confined to a part of the field of fixation, or is greater in some parts than in others. To ascertain which muscle or muscles are paralyzed, note the direction in which the eyes must be turned in order to produce the greatest deviation, or widest separation of the two images, this being the direction in which the paralyzed muscle is most needed to turn the eye. The false image, belonging to the eye which cannot be normally turned, always appears farthest in the direction the eyes are turned. Thus, on looking up, the false image appears higher than the true image; on looking to the right the false image appears the farther to the right. By alternately covering the eyes we can find to which eye the false image belongs, and so the exact muscle or muscles affected.

Diplopia is the rule in paralytic strabismus, unless one eye be blind or covered by a drooping lid; but it is the exception in comitant strabismus.

To recognize latent squint we must prevent binocular vision. To secure binocular vision the strabismus is rendered latent, and when the effort necessary to prevent strabismus no longer secures binocular vision it is given up and the eyes

are allowed to deviate. Binocular vision is prevented by covering one eye. When this is done the covered eye deviates. But on removing the covering the eye quickly turns to the position of true fixation. The deviation of the eye under cover may be so slow as to be with difficulty noticeable; but the quick "recovery" when the cover is removed is very apparent.

By shifting the cover quickly from one eye to the other the eyes may be made to deviate and "recover" alternately. By so shifting the cover back and forth while the patient gazes at a distant lamp-flame, he will see the lamp-flame appear to jump back and forth from one position to another as the cover is shifted. The direction in which the eyes deviate and "recover" and the direction in which the flame appears to jump will tell the variety of latent strabismus present.

Binocular vision may be prevented by making the image received in one eye so unlike the other that there will be little or no tendency to fuse them. This may be done by placing before one eye a dark-blue or purple glass. On looking at a distant flame the patient then sees two: one of the natural color, the other blue or pink. In orthophoria these appear superimposed; but with heterophoria they appear separated. The direction in which they are removed from one another indicates the kind and the distance the amount of latent strabismus.

Binocular vision may also be prevented by use of a prism which so displaces the image formed in one eye that it cannot be fused with the image formed in the other eye. Thus, in the "Graefe test" a prism of 8 or 10 centrads is held with its base up before one eye, and the gaze fixed upon a dot in the centre of a blank card. To the eye before which the prism is held the dot appears displaced downward. In

orthophoria it appears directly below the true image. In esophoria the lower dot appears below and toward the side of the eye that sees through the prism; in exophoria downward and toward the opposite side. The phorometers of Stevens and others are mostly based on this principle.

The *Maddox rod-test* is really one in which one image is so distorted as to prevent its fusion with that of the other eye. A very strong cylinder, either a piece of a small glass rod or a concave cylinder of similar strength, is placed before one eye. Seen through this a point of light appears as a long streak. The other eye being left uncovered, the streak appears in orthophoria to pass through the point of light. But in heterophoria the streak appears to pass to one side of the point of light. The side on which it appears to pass indicates the variety of latent squint, and the distance of the streak from the light, or the strength of prism required to cause it to pass through the light, shows the amount or degree of the tendency to deviation.

The method of measuring the amount of strabismus by prisms is applicable in all cases of manifest or latent squint in which the patient can recognize binocular diplopia. It consists in placing before the eyes such prisms as will cause the true and false images to coincide in spite of the strabismus. Such prisms will substitute binocular vision for diplopia; and will do away with all movements of deviation and recovery, or of apparent movement of the point of light looked at, when the cover is shifted from one eye to the other in rapid alternation.

Prognosis.—For apparent squint due to displacement of the cornea, we can do nothing except at the cost of binocular vision. Comitant strabismus is outgrown in a few cases in early childhood without

treatment; and in a much larger percentage of cases may be permanently cured by the wearing of glasses, and proper orthoptic exercises. Comitant strabismus in adults, if intermittent, may be cured by correcting lenses; but if constant will generally require an operation. All cases of comitant squint are capable of relative cure by operations judiciously chosen and skillfully performed, except such as suffer from diplopia when the image is thrown on the fovea of the deviating eye. The exactness and permanence of the cure depend on the possibility of establishing true binocular vision.

Paralytic strabismus may be cured by cure of the paralysis causing it. If the paralysis be very marked, it will probably not recover in less than six weeks, or after six months will not recover at all. After incomplete recovery from paralysis of one of the eye-muscles, operative treatment may give practical relief. Strabismus due to a permanent complete paralysis cannot be cured. The diplopia of comitant strabismus usually ceases to be annoying or disappears entirely. Diplopia from paralytic squint, except when it has occurred in childhood, will commonly last throughout life.

Treatment.—In every case of strabismus, any obstacle to easy binocular vision, in the form of an error of refraction, should be removed by the constant wearing of correcting lenses. All eye-work or habits tending to cause or perpetuate the strabismus should be discontinued. If due to an ocular palsy this should be treated. If of recent origin, orthoptic exercises should be resorted to. If the strabismus be constant and of long standing, and not much influenced by the wearing of correcting lenses, and if throwing the image on the fovea of the deviating eye when the fixing eye is also

in use does not cause diplopia, an operation should be done.

Correction of any error of refraction is the first step. It may be done at a very early age. Children two years old can have their correcting lenses determined by skiascopy; and will readily and gladly wear them, if they are much needed and accurately adjusted. The avoidance of injurious use of the eyes may require the use of a mydriatic to suspend all effort of accommodation. Or it may include, for monolateral strabismus, the covering of the fixing eye, or the placing of it alone under the influence of a mydriatic, to compel the patient to use the eye he would otherwise allow to deviate.

Orthoptic exercises include: the viewing of special diagrams and pictures through the stereoscope; the exercise of muscles that are relatively inefficient by placing prisms so that they will bring the true and false images close enough together for the muscles to complete their fusion, in actual squint, or so that the prism will require special exertion to "overcome" it in latent squint. They also include the use of "fusion tubes," which are applied one to each eye and turned so that the eyes can just fuse the minute openings in the distal ends of the tubes. Also the employment of the "reading-bar," an opaque bar supported above the page in such a way that it cuts off a portion of each line from one eye, and another portion from the other eye, compelling fixation with both eyes for the reading of each line. Under this head also comes the practice of exercising convergence, by fixing on a point that is gradually made to approach the eye until the requirement of convergence becomes too great to be sustained. Or the practice of viewing through strong prisms, turned with the base toward the nose, a

point which starts near the eyes, but is slowly withdrawn until the limit of the power of abducting the eyes is reached.

Operations on the ocular muscles are of two kinds: tenotomy, designed to lessen the influence of an overacting muscle; and advancement, designed to increase the influence of a muscle relatively weak or inefficient. Tenotomy is the simpler and less formidable operation. But it tends to lessen the total mobility of the eye, and if injudiciously performed may cause the eye to deviate in the opposite direction. Advancement is more difficult, but it does not lessen the mobility of the eye, and is not likely to cause a strabismus of the opposite kind.

For *tenotomy* the eye is cocaineized and the conjunctiva seized over the insertion of the muscle to be operated upon, and incised with a snip of the scissors. The incision may be small—4 or 5 millimetres (subconjunctival method)—or large 8 or 10 millimetres (open method). The subconjunctival tissue is then similarly raised and snipped through, down to the sclera. A strabismus-hook is now introduced beneath the tendon, and made to lift it from the sclera. One blade of fine, but blunt-pointed, scissors is then slipped beneath the tendon close to its insertion, and the tendon is divided at this point by the scissors.

For a *partial tenotomy* a small conjunctival incision is made over the centre of the tendon at its insertion, after which the tendon itself is caught up with the forceps and snipped through. Then, through the small central opening so made, a small strabismus-hook is introduced and the tendon divided on either side, until only a thin margin remains, which can be readily stretched with the hook. The subsequent stretching of these margins permits a slight retraction of the whole tendon.

To increase the effect of a tenotomy by permitting a greater retraction of the divided tendon, its lateral connections may be divided and the tendon thus isolated from all its attachments that indirectly connect it with the eyeball. Another measure is to keep the eye forcibly rotated away from the tenotomized muscle by what is called the *thread-operation*. In this a suture is inserted near the divided muscular insertion and made fast over a roll of adhesive plaster so as to keep the eye in position for the divided tendon to slip as far back as possible.

Advancement of the ocular muscles is done in several different ways. The natural insertions of the recti tendons are from five to nine millimetres back from the margin of the cornea. The common operation is done through a free incision parallel to the corneal margin. The tendon is isolated, raised from the globe, its insertion divided, and brought forward to or near the corneal margin, where it is fixed by sutures. The sutures may be passed through firm scleral tissue or may only include conjunctiva and subconjunctival tissue, one passing above and another below the cornea. The former give the more certain and definite attachment, but the latter are easier to insert. When a marked deviation is to be corrected, advancement of one muscle is accompanied by tenotomy of its direct antagonist. Sometimes a portion of the advanced tendon is cut off (muscle-shortening). Sometimes the tendon is not divided at its insertion, but is folded upon itself, and so shortened (tendon-tucking). Some operators do not attempt to isolate the tendon, but pass sutures through the conjunction and capsule of Tenon. This is spoken of as *capsular advancement*.

After an operation for strabismus it

usually is best not to keep the operated eye bandaged for more than a few hours, or, at most, a day or two. It should be brought into use with the other eye as quickly as possible, and correcting lenses worn constantly, and such use made of the eyes, or such orthoptic exercises resorted to, as will favor the perfecting of binocular movements and binocular vision.

Prisms, aside from their use as means of securing orthoptic exercise and training, are of value in relieving from some of the consequences of strabismus. In actual lateral squint they are scarcely applicable, because the squint is usually of such high degree that the necessary prism would be too thick and heavy to wear. But for vertical strabismus, or for latent squint, they are often of great practical service. The apex, or thin part, of the prism is turned in the direction in which the eye turns or tends to turn. Thus, for right hyperphoria the prism for the right eye would be turned with its edge up, its base down. Turned in this way the prism does not "correct," but rather "permits" the deviation. But the prism removes the unpleasant effects of such a deviation, such as diplopia, or the strain of the ocular muscles necessary to preserve parallelism of the visual axes. Prisms may be valuable aids in establishing binocular vision after an operation on the eye-muscles or during recovery from paralysis of one or more of the ocular muscles.

Literature of '97-'98-'99.

In personal operation in cases of strabismus conjunctival incision is made close to the cornea, so as to leave no conjunctiva at this spot. The muscle to be advanced is then slightly separated from the surrounding tissue, but not extensively freed. A pair of squint forceps is now applied, and two silk sutures are put into the muscle rather far back, and

the latter is divided between the forceps and the sutures. The tendon is cut right away from its attachment to the sclera. The sutures are then brought forward and inserted well into the episcleral tissue, and as close to the corneal limbus as possible. If, now, the eye is rotated toward the divided muscle by an assistant, the operator can tighten the sutures as much as possible, thus bringing the cut end of the muscle close to, or even overlapping, the cornea. In the latter case the free end may be incised in the middle, parallel to its fibres, so that the divided ends come to lie on each side against the margin of the cornea. In convergent squint atropine is applied to both eyes so as to induce more complete rest. Both eyes are bandaged for five days at least in divergent strabismus, and for several more days in convergent strabismus, so that there shall be no inducement for the patient to use his two internal recti together. As soon as the advanced muscle or muscles are firmly attached, one eye is left open; and, after one or two weeks, methodical exercises of convergence are practiced with the proper correcting lenses before the eyes. It is important that the patient upon whom this operation is performed should be kept in bed with both eyes bandaged for the first few days. E. Landolt (*Archives of Ophthal.*, Jan., '97).

Great importance is attributed to the immediate influence of the binocular function in establishing a perfect equilibrium after tenotomy while the tendon is more or less completely detached from the eyeball. This function compels the eye to occupy the position in which single vision is possible, and thereby helps to determine the point at which reattachment of the tendon shall take place. If, on the other hand, the eye is bandaged, it assumes its position of rest: there is no tension or straining of the tendinous fibres induced by the desire for binocular single vision, and the reattachment may take place at a point by no means the most favorable for that purpose. F. W. Marlow (*Ophthalmic Record*, p. 117, '97).

The means employed in the educative treatment of strabismus include: 1. The

occlusion of one eye by a shade or pad. Usually it is the "good" eye which is occluded to compel the use of the squinting eye, to promote its true fixation, and to improve its visual acuteness. But if it becomes necessary at times to use the "good" eye, the shade should be transferred to the other. For the squinting eye had better be in darkness than continue to form images which the brain does not perceive.

2. Bar-reading—that is, reading with a ruler or something of the kind held between the page and the face, so that a part of each line is hidden from either eye alone, and the two eyes must be used to read the whole of it. This helps the recovery of binocular vision by making the patient conscious each instant of the deviation, and by compelling the movements necessary to fix with the squinting eye. It is not applicable to very young children.

3. The use of "fusion-tubes" is useful for children who cannot read. These are two tubes each of which has a convex lens in the end held toward the eye, and a shutter with a small hole covered with ground-glass in the other. The distance from the lens to the shutter is the focal distance of the lens. The tubes are connected by chains, so that they can be turned in the direction of the two visual axes in any case of squint. The exercise with them consists in making the two holes appear as one, and in keeping them fused as the direction of the tubes is slowly changed. This cultivates the faculty of binocular fusion. Priestley Smith (*Ophthalmic Review*, June, '98).

EDWARD JACKSON,

Denver.

STRONTIUM.—Strontium is an alkali metal having a yellow color. It oxidizes quickly on exposure to the air, and must be kept under naphtha, benzene, or other liquid free from oxygen, like the other alkali metals. Strontium forms salts with the acids and with bromine, chlorine, fluorine, etc. Three salts are offi-

cial: the bromide, the iodide, and the lactate.

Strontii bromidum (U. S. P.) occurs in long, deliquescent colorless needles, having a bitter, saline taste. It is soluble in alcohol, in 1.05 parts of cold and in 0.5 part of boiling water. This salt must be kept from the air.

Strontii iodidum (U. S. P.) occurs in white, or faint-yellowish, microcrystalline, deliquescent powder or in almost colorless, hexagonal plates, having a bitter, saline taste. It is soluble in alcohol and in ether, in 0.6 part of cold and in 0.27 part boiling water. This salt must be kept from the light and air.

Strontii lactas (U. S. P.) occurs as a white, granular powder, having a slightly-bitter taste. It is soluble in alcohol and in 4 parts of cold and in 0.5 part of boiling water. This salt is unaffected by the air.

Strontii acetas occurs as a white, crystalline powder, soluble in water. It is used as an anthelmintic and intestinal tonic. Dose, $\frac{1}{4}$ to $\frac{3}{4}$ grain.

Strontii nitrate occurs in colorless crystals, soluble in 1.4 parts of water and slowly in alcohol. It is not official. Dose, 5 to 20 grains.

Strontii salicylate occurs in octahedral crystals soluble in water and in alcohol. It is not official. Dose, 10 to 40 grains.

Preparations and Doses.—Strontii bromidum (U. S. P.), 5 to 30 grains.

Strontii iodidum (U. S. P.), 5 to 30 grains.

Strontii lactas (U. S. P.), 5 to 30 grains.

Physiological Action.—The strontium salts do not seem to produce any profound effect upon the human system. They appear to improve the nutrition of the body, and have not been taken in sufficient dose to produce distinct symptoms: no case of poisoning from these

salts has been reported. The presence of even a minute portion of barium, however, makes the preparation violently poisonous. The dominant action of the strontium salts is that of the substance with which the strontium is combined. Strontium bromide, having the action of a bromide, is a nerve-sedative and antispasmodic. Strontium iodide acts as an iodide, and is an alterative and sialogogue. Strontium lactate appears to have the power of diminishing or arresting the excretion of albumin, without, however, increasing the amount of fluid excreted.

Literature of '97-'98-'99.

The following conclusions are reached as to the effect of strontium lactate: 1. The tension in the circulatory system falls. 2. The pulse, at first slow, becomes quicker as the dose is increased, while the respiration remains unaltered throughout the experiment. 3. Large quantities of the drug (16 g. to 30 lbs. of the weight of the animal) irritates the kidneys, and with still increasing dose blood appears in the urine. 4. In some forms of Bright's disease the drug has a diuretic action, and diminishes the amount of albumin. 5. It is improbable that the drug has a direct action upon the renal epithelium. Bronovsky (Vratch, No. 29, '97).

Concerning the influence of the salts upon the circulation, full and satisfactory reports have not been made. Lanicque and A. Malbec (Compt. Rend. de la Soc. de Biol., iv, '92) assert that strontium iodide produces a primary pronounced elevation of the arterial pressure, with a lessening of the number of the heart-beats, and, after a time, if the dose has been large enough, a marked fall of pressure accompanied by a very feeble, rapid action of the heart. Binet states that in poisoning by the strontium salts, although the cardiac beat is very

feeble, the arrest finally takes place in systole.

The absorption of the strontium salts and their elimination, chiefly through the kidneys, appears to be rapid. Laborde states that the lactate and tartrate have a positive and marked diuretic and antiseptic action, and exert a profound influence in the alimentary canal and upon the excretions with which they are voided from the body. It is claimed that the strontium salts are only partially eliminated in the urine and fæces, a portion being retained within the body, and deposited in the bowels, liver, and, to a less extent, in the soft tissues.

Therapeutics. — **GASTRO-INTESTINAL DISORDERS.**—In the treatment of acute gastritis, Carselli, of Palermo, has found the bromide a remarkably efficient remedy, given in doses of 10 grains, three times a day, with or after meals. It is said to stop the vomiting and lessen the pain, which it accomplishes not only by a direct action upon the nervous system, but also through its action as an antiseptic by arresting fermentation and diminishing flatulence.

In hyperacidity of the stomach and in acid dyspepsia the lactate has been found to aid the digestion, inhibit fermentation, and act as a general tonic to nutrition. It has also proved efficient where there was a deficiency of hydrochloric acid.

In chronic gastric and intestinal catarrh the lactate is an efficient remedy.

The digestive disturbances associated with diseases of the heart and kidneys are notably ameliorated by the bromide. Nervous dyspepsia and gastralgia, nervous vomiting, and dilatation of the stomach are all amenable to the action of the bromide.

Strontium salicylate, although not official, has been used in the treatment of flatulent dyspepsia and intestinal fer-

mentation. It is said to be well borne and to improve the digestion. It is given in doses of from 5 to 10 grains after meals and is best given in capsules. For use as an intestinal antiseptic, the salicylate may replace, with advantage, salol, naphthol, etc.

The lactate is said to be an efficient tæniacide, given in a 15-per-cent. solution in water and glycerin, the dose being 1 tablespoonful twice daily for five consecutive days.

RHEUMATISM AND GOUT.—In rheumatism and gout the lactate has been found to exert the general favorable action of the strontium salts upon the alimentary canal, to increase nitrogenous elimination, and to cause the disappearance of the urates. Although the usual dose is from 20 to 30 grains, given in solution, three times a day, much larger amounts have been exhibited without causing untoward symptoms.

The salicylate has been given with good results in muscular and subacute rheumatism, and in chronic gouty manifestations accompanied by digestive disturbance.

Rheumatic manifestations often yield promptly to the iodide. It is particularly efficient in chronic, subacute, and muscular rheumatism. Sciatica and trifacial neuralgia, dependent upon a rheumatic taint, will often yield to this remedy. It is likewise of avail in chronic and subacute gout. The nitrate, in 30-grain doses, has been used advantageously in articular rheumatism.

CUTANEOUS DISORDERS.—In eczema dependent upon Bright's disease and psoriasis due to a rheumatic diathesis, the lactate effects improvement. The bromide affords signal relief in senile pruritus.

Lichen scrofulosum, strumous acne, and eczema, and other affections of the

skin occurring in scrofulous subjects, are improved by the administration of the iodide. It is likewise beneficial in chronic eczema with excessive infiltration and thickening of the skin. In lupus vulgaris the iodide is a good systemic remedy. Eczema, erythema multiforme, erythema nodosum, purpura rheumatica, psoriasis, and paræsthesia, caused by gout or rheumatism, are benefited through the use of this salt. J. V. Shoemaker has seen good results from the use of the iodide in the treatment of large pustules of the scalp, tubercular syphilides, and in all the later manifestations of syphilis.

GENITO-URINARY DISORDERS.—In chronic Bright's disease G. Sée and others have found the lactate a valuable remedy, as it diminishes or arrests the secretion of albumin, sometimes increases the amount of the urine, and improves the general nutrition. In albuminuria due to pulmonary congestion, it is said to be of no service. In desquamative nephritis its good influence is especially marked; it is much less pronounced in interstitial nephritis. In many cases there is no increase in the flow of the urine, and the good achieved seems to be due to an alterative influence upon the secreting structure of the kidney (H. C. Wood). The lactate is efficacious in scrofulous, gouty, and rheumatic nephritis, and in the albuminuria of pregnant and puerperal women, and in that of cardiac origin, but is of no service after the manifestations of uræmia appear.

In diabetes the bromide has been observed to have a decided effect in reducing the amount of sugar excreted in the urine.

CONSTITUTIONAL DISORDERS.—In certain constitutional disorders, the iodide is an excellent remedy. It is valuable in the treatment of enlarged lymphatic glands, scrofuloderma, chronic abscesses,

diseases of the bones and joints, in scrofulous otorrhœa, ozæna, and ophthalmia. The iodide was introduced as a means of obtaining the alterative influence of an iodide without causing irritation of the intestinal tract or depression of the general nutrition. This salt contains about 56.5 per cent. of iodine, and may be substituted for potassium iodide with advantage.

CARDIAC AND VASCULAR DISORDERS.—Germain Sée recommends the use of the iodide in various affections of the heart. It may replace potassium iodide in the treatment of aortic aneurism. Experience has shown it to be useful in arteriosclerosis and in angina pectoris. Laborde and A. Malbec conclude that the iodide has a decided influence upon the heart, and is of service in affections of the myocardium and in lesions of the aortic valves and the arteries. This salt can be safely given in comparatively large doses, and may replace the potash salt whenever the latter is not well borne.

NERVOUS DISORDERS.—In epilepsy the bromide, in doses of from 40 to 80 grains daily, has been employed with satisfactory results. It is tolerated by the stomach, and has not, as yet, given rise to bromism. The paroxysms of hystero-epilepsy have also been controlled by this salt. In true epilepsy it diminishes the frequency of the paroxysms better than the potash salt; an improved mental condition and lessened somnolence and excitability commend it over the other bromides; moreover, this salt usually improves the appetite and digestion. H. C. Wood used the bromide chiefly as an adjuvant to ammonium bromide, as the strontium salt seems to have less control over the epileptic paroxysms than the older bromides.

C. SUMNER WITHERSTONE,

Philadelphia.

STROPHANTHUS.—*Strophanthus* (U. S. P.) is the seed of *Strophanthus hispidus*, De C., deprived of its long awn. The plant itself is a climbing apocyanaceous pod-bearing shrub of the western part of Africa. The seeds within the pods are abundantly provided with very large, deciduous hairs, which are apt to be shed within the pod itself, and are so numerous as to weigh nearly as much as the seeds. The seeds contain a white, intensely bitter, crystalline principle called strophanthin, which is a glucoside, partly soluble in water and in alcohol. *Strophanthus* is not official, but may be given in doses of from $\frac{1}{300}$ to $\frac{1}{120}$ grain. The tannate of strophanthin occurs as a yellowish-white amorphous powder, soluble in alcohol, containing 58.14 per cent. of strophanthin, and although not official may be used in the same manner as strophanthin in double the dose ($\frac{1}{150}$ to $\frac{1}{60}$ grain), as it is more easily taken. The preparation generally used is the official tincture (tinctura strophanthi, U. S. P.), containing 5 per cent. of the drug, which may be given in doses of from 3 to 10 minims.

Physiological Action.—According to Drasche, in the healthy man strophanthus in sufficient dose produces a fall in the rate of the pulse, with increase of arterial pressure, without any effect upon the respiration. If the dose has been sufficiently large, it produces gastric irritation and a slight fall in temperature. The hypodermic injection of 15 drops of the tincture induced violent local irritation, repeated vomiting with nausea, pronounced diuresis, and a fall of the pulse. Twenty drops by the mouth decreased the pulse 30 beats. Although strophanthus is primarily a muscle-poison, it probably has little or no effect upon the nerve-centres or nerve-trunks unless locally applied. It is locally irri-

tating and stimulating to the gastro-intestinal mucous membrane, and even to a greater degree to the secreting structure of the kidneys. *Strophanthus* is probably excreted by the kidneys, escaping with the urine.

Poisoning by Strophanthus.—The symptoms of poisoning by strophanthus are those of gastro-intestinal irritation (burning in the œsophagus and stomach and vomiting), with irritation or inflammation of the kidneys. Death occurs by reason of cardiac paralysis. The treatment of poisoning by this drug consists in the use of emetics, lavage of the stomach by means of the stomach-siphon, and the administration of one of the physiological antidotes, aconite or veratrum viride.

Therapeutics.—The indications for the use of strophanthus are similar to those of digitalis; it is conceded that it is quicker and less enduring, but less certain, in its action than digitalis.

In cardiac weakness a single dose usually produces a fall in the frequency and an increase in the force of the pulse in from one-half to one hour, the effects lasting from four to eight hours.

In acute collapse strophanthin may be given by hypodermic injection.

In pulmonary cedema and pronounced general dropsy due to cardiac disease, strophanthus appears to be superior to digitalis, but for continuous use in cardiac disease digitalis is generally preferred, strophanthus being substituted when a very immediate, temporary effect or a temporary change of remedies is required. (H. C. Wood.)

In renal affections with secondary failure of the heart, it is a very valuable remedy. Rothziegel, Koralzewski, and H. Haas commend it highly, not only in chronic, but also in acute Bright's disease.

E. D. Ferguson recommends this drug in exophthalmic goitre, believing that it relieves the overtaxed heart by overcoming resistance in the systemic circulation. He advises the use of 8 minims of the tincture at first, gradually increasing the dose to 25 minims, several times a day.

Literature of '97-'98-'99.

The indications for the use of strophanthus are: (1) rapid recurrence of cardiac systole with diminished force and irregular rhythm; (2) Bright's disease, when associated with permanent high arterial tension, and also the conditions of arteriosclerosis and senile rigidity of arteries; (3) any condition where diuresis is required and can be promoted by increased blood-pressure. Further, in any of the conditions where a drug of similar action is required strophanthus is to be preferred if the symptoms are urgent or if the administration of the drug is likely to be prolonged. Strophanthus is to be avoided in cases with advanced degeneration of the myocardium or with extreme mechanical obstruction to the circulation from valvular incompetence or stenosis.

Strophanthus has this definite advantage over digitalis, namely: greater rapidity of action, more powerful diuretic effect, absence of digestive disturbance, absence of cumulation, the drug does not lose its effect with continuous administration, greater value in children, and greater safety in the aged.

The dose recommended is 5 minims, which should not be given more than three or four times *per diem*. Wilcox (Amer. Jour. Med. Sci., May, '97).

The special advantages of strophanthus over digitalis are as follow: It does not produce gastric disturbances, and does not show cumulative action. The constriction of the vessels by digitalis may be a source of great danger, owing to the extra strain thrown on the ventricle, especially in fatty heart. Strophanthus has no such tendency. It acts quicker and with greater certainty. Owing to

its ready solubility it is better for hypodermic administration, and the strength of its preparations can be more easily standardized. E. M. Houghton (Jour. Amer. Med. Assoc., Sept. 11, '97).

To maintain the effect of the drug it should be given at least every eight hours. The tincture is too irritating for hypodermic use. Strophanthus by hypodermic injection has shown perceptible action within five or ten minutes. The maximum daily dose of strophanthus is $\frac{1}{100}$ grain.

The commercial strophanthin, as put upon the market by manufacturers of the first class, is an extremely active substance.

The activity of the strophanthin itself is much more marked in raising the arterial pressure than that of the extract. H. C. Wood and W. S. Carter (Amer. Jour. of Pharm., July, '96).

C. SUMNER WITHERSTONE,
Philadelphia.

STRYCHNINE. — Strychnine (strychnina, U. S. P.) is an alkaloid obtained from *nux vomica* (*Strychnos nux-vomica*; nat. ord., *Loganiaceæ*) and from other plants belonging to the same natural order. Strychnine occurs in small, hard crystals having a very bitter taste, and is soluble in 7 parts of chloroform, in 110 parts of cold and in 12 parts of boiling alcohol, and in 6700 parts of cold and 2500 parts of boiling water. In addition to its medicinal uses it is employed as a poison for rats, mice, foxes, and wolves. Strychnine forms many salts, of which the sulphate is official.

Strychnine sulphate occurs in white, odorless prisms, having a very bitter taste, which effloresce in dry air. It is soluble in 50 parts of cold and in 2 parts of boiling water, and in 109 parts of cold and in 8.5 parts of boiling alcohol.

Preparations and Doses.—Strychnina (U. S. P.), $\frac{1}{60}$ to $\frac{1}{20}$ grain.

Strychninae sulphas (U. S. P.), $\frac{1}{32}$ to $\frac{1}{12}$ grain.

Ferri et strychninae citras (U. S. P.), 1 to 5 grains. (See IRON.)

Syrupus ferri, quinae, et strychninae phosphatum (U. S. P.), $\frac{1}{2}$ to 1 drachm. (See PHOSPHORUS.)

Physiological Action.—In small therapeutic doses strychnine produces very little disturbance of the system, but acts as a powerful bitter tonic. The administration of large therapeutic doses is followed by a marked general stimulation and increase of bodily tone, and, if the doses be larger, the respiratory centres are powerfully stimulated and the blood-pressure, pulse-beat, and pulse-rate are increased.

Strychnine acts the same upon almost all animals. Its local action is that of a slight irritant. When taken by man, in doses sufficient to produce sensible physiological effects, a feeling of restlessness appears, accompanied, perhaps, by tremblings in the limbs and some stiffness in the neck and jaws. The ingestion of larger amounts may be followed by general muscular twitchings, with stiffness of the throat and chest, and formications or other unnatural sensations under the skin may be present. In overdose strychnine produces spinal or tetanic convulsions.

CEREBRUM.—Strychnine appears to have little or no effect upon the cerebral cortical centres. According to H. C. Wood, the stimulation of the special senses sometimes seen in the beginning of strychnine poisoning is probably, though not certainly, peripheral in its origin, and consciousness is probably never directly affected by this drug.

SPINAL CORD.—Claude Bernard has denied that strychnine produces excita-

tion of the spinal motor centres, because, when all the posterior nerve-roots are cut, no convulsions occur, whereas, if a single afferent root be allowed to remain, irritation of its peripheral fibrillae will cause general tetanic spasms. While allowing the truth of the experimental fact, Wood does not agree with his deduction, and considers it proved by the experiments of Van Deen and others, including himself, that strychnine is a powerful stimulant to the cells of the spinal cord, including in this term the whole spinal tract up to the pons Varolii. Spitzka has shown that enormous doses of strychnine injected intravenously kill almost instantaneously without the production of a spasm, probably, as Wood suggests, by killing the nerve-centres, in the same manner that large doses of a cardiac stimulant overwhelm and paralyze the heart.

MOTOR NERVES.—From the experiments of Vulpian, Reichert, and H. C. Wood, it may be considered proved that in the warm-, as well as in the cold-blooded animals strychnine depresses directly the motor nerves, although it is probable, as is insisted upon by Poulsson, that the spinal cord is also paralyzed, because in certain frogs, and also in mammals, the paralysis appears to be complete at a time when the motor nerves are still capable of responding to stimuli (H. C. Wood).

CIRCULATION.—Strychnine has a very decided effect upon the circulation. Richter, Mayer, Schlesinger, and Klapp have noted a decided rise of arterial pressure before or about the time of the first convulsion, not due, however, to the convulsion, as it occurs in curarized animals in which artificial respiration is maintained. Mayer and Richter affirm that the rise of arterial pressure is due to stimulation of the vasomotor centres.

Klapp and Reichert have shown that primary stimulation of the vasomotor centres by strychnine is followed by a fall of arterial pressure and vasomotor paralysis; also that very large doses produce an immediate depression of the vasomotor centres and a fall of arterial pressure. An increase in the pulse-beat and in the pulse-rate follows after the injection of moderate doses of strychnine, probably due to a stimulation of the heart-muscles and its ganglia. When injected intravenously in large doses, Reichert noted, at first, a transient increase of pulse-rate, due to the immediate, overwhelming action of the undistributed strychnine upon the inhibitory apparatus of the heart; second, a lessening of the pulse-rate, due to slight stimulation of the pneumogastric endings; third, a marked increase in the pulse-rate, due to pneumogastric depression; and, finally, a decrease in the pulse-rate, due to an influence upon the heart-muscle or its ganglia.

RESPIRATION AND TEMPERATURE.—Strychnine is among the most constant and powerful of the respiratory stimulants. In a series of very careful experiments H. C. Wood found that the injection of strychnine produced in the dog an extraordinary increase in the respiratory air-movement, which was never less than 75 per cent., and sometimes rose to 300 per cent. A. Obermeier has found, experimentally, that small doses of strychnine produce in the rabbit no distinct alteration in the elimination of carbonic acid, but that after large doses there is a rise of the animal temperature and a very noticeable increase in the elimination of carbonic acid. It has been suggested that the increase in temperature which occurs after poisonous doses may be produced by the severe muscular action during the convulsions;

small doses of strychnine have no apparent effect upon the body-temperature.

ABSORPTION AND ELIMINATION.—The absorption of strychnine is immediate, and, according to R. W. Lovett, it accumulates especially in the spinal cord. Ipsen claims, however, that it is to be found in all the organs in direct proportion to the amount of blood going to them. It has been found in the brain by Grandval and Sajoux (*Union Méd. de Nord-est*, May, '92).

Strychnine is eliminated from the body by the kidneys, partly unchanged (Wormley, P. von Rautenfeld, Schauenstein, and others), and partly as strychnic acid. Schiff and Lautenbach believe that strychnine is oxidized and destroyed, at least in part, in the liver: a conclusion which is strongly combated by Chouppe and Pinet, and considered very doubtful by H. C. Wood. Strychnine may be found in the urine five minutes after its absorption (Ipsen). Kratter and Mann affirm that the elimination of strychnine is complete within forty-eight hours.

Literature of '97-'98-'99.

Personal experiments regarding the absorption of strychnine have established the following points:—

The absorption of strychnine in the stomach is incomparably lower than in any other section of the alimentary canal, and, furthermore, the absorbent power of the fundus seems to be even lower than that of the entire stomach. The power of absorption in the oesophagus is somewhat better than in the stomach, but is still considerably inferior to the absorption within the other parts of the alimentary canal. The power of absorption in the other three parts of the canal—*i.e.*, the small intestines, colon, and rectum—seems to be equal. The isolated rectum absorbs at least as well as the small intestines; in some experiments the effects appeared earlier when the rectum was isolated than when it had

free connection with the remainder of the gut; from no part of the canal were such short intervals between the injection of the strychnine and the appearance of the tetanus observed as were frequently seen when it was injected into the rectum—in the latter case the interval was sometimes only two or three minutes; finally, impaction of the rectum proved to be no hinderance to the prompt absorption of the poison therefrom. S. J. Meltzer (Amer. Jour. Med. Sci., Nov., '99).

Poisoning by Strychnine.—After poisonous doses of strychnine have been taken the symptoms usually appear in from fifteen to twenty minutes, rarely later than an hour, with great suddenness. Sometimes the convulsions are preceded by partial spasms of the muscles of the extremities, but more often the patient is suddenly thrown down by a general tetanic spasm (H. C. Wood). The condition is one of profound opisthotonos, the body is bent backward and rests upon the heels and head. The legs are extended, the feet everted, the arms bent, and the hands clinched. The eyes, staring, are wide open, the corners of the mouth are drawn up (*risus sardonius*). The face is at first pale, but may become livid from interference with respiration. Consciousness is not affected unless asphyxia is so pronounced as to threaten death; the senses are often more acute, but tinnitus and amaurosis may be present if the paroxysms are severe. The muscles of the jaw are generally the last in the body to become affected, but trismus finally comes on in severe cases. II. C. Wood has seen death occur in this first convulsion in animals, but Tardieu states that he knows of no such instance in man.

After a shorter or longer time muscular relaxation sets in and a period of calm ensues, to be succeeded by a second convulsion. The slightest noise, draught

of air, or touch may cause a convulsion or series of convulsions, because the sensory impulse reaching the spinal cord causes a spasmodic motor impulse to be sent out to the muscles; a firm grasp or hard rubbing of the muscles is frequently grateful (Wood). During the spasms progressive asphyxia is present, the respiratory muscles being in a state of tetanic rigidity; during the periods of relaxation the patient breathes easily.

A slight rigidity is sometimes present during the periods of relaxation, but no marked stiffness. The cramp-like contraction of the muscles is generally, but not always, painful. Erections of the penis are not infrequent, and the urine and feces may be voided involuntarily. If the case is to terminate favorably the convulsions gradually lessen in severity and finally cease, leaving the patient exhausted, with a sore, tired feeling in the muscles from overcontraction. Death occurs either from cramp-asphyxia, or, more rarely, from exhaustion. Post-mortem examination reveals the usual congestive lesions of death from asphyxia and, at times, indications of spinal hyperæmia (Wood).

Strychnine poisoning may be confounded with traumatic or hysterical tetanus. The convulsions of strychnine poisoning do not resemble those of epilepsy, as they are distinctly tonic and never clonic. In tetanus the locking of the jaws (trismus) comes first, in strychnine poisoning it comes last. The convulsions of tetanus rarely, if ever, completely relax; in strychnine poisoning periods of relaxation occur. In tetanus there is usually the history of an injury, or of a rusty nail or needle run into the foot or other part of the body.

The minimum fatal dose of strychnine is probably something under $\frac{1}{2}$ grain (II. C. Wood). One one-hundredth of a

grain is said to have killed a child $3\frac{1}{2}$ months old. Ten, 20, and 22 grains, taken upon a full stomach and retained two hours, have failed to cause death in each case, probably on account of slow absorption (Wood).

Treatment of Poisoning by Strychnine.

—If no symptoms have appeared, inhalations of amyl-nitrite may be administered and the stomach washed out. The chemical antidotes—as tannic acid, iodine, or one of its soluble salts—may now be administered, but should be followed by a quickly-acting emetic or be removed by the stomach-tube, as the compounds formed by those substances are not permanent. Potassium bromide ($\frac{1}{2}$ ounce) combined with chloral ($\frac{1}{2}$ to 1 drachm) may at first be given, and every twenty minutes afterward, if necessary, 2 drachms of the bromide and 15 grains of chloral. The bromide and chloral are physiological antidotes, the former depressing the sensory tracts of the cord, the latter depressing the motor tracts. Artificial respiration is very valuable, but is seldom available in man. Other drugs are favorably mentioned as antidotes. Hydrastinine hydrochloride, given hypodermically, in the amount of 1 grain, has been successful. Nicotine has proved efficient in many cases; also tobacco by enema. Chloroform or amyl-nitrite, by inhalation, may be used to procure muscular relaxation, but they must obviously be used during the period of relaxation, as they cannot be utilized when the chest-muscles are in a state of severe tonic contraction. Veratrum viride has cured a bad case; a fluidrachm of the tincture was given at once, followed by 2 drops every ten minutes (Ringer).

Literature of '97-'98-'99.

Led by the accidental observation of the recovery of a dog from strychnine

poisoning after eating about 4 ounces of lard, a series of thirteen experiments were made on dogs and other animals. In all cases, except the first two hogs (which died from 2 grains each of strychnine, with only 6 ounces of lard administered as an antidote, the last two, however, recovering from the same dose of strychnine after taking 12 ounces of lard), the animals recovered, although the lard was not administered until after convulsions had well set in. W. D. Turner (Indian Lancet, June 1, '98).

Therapeutics. — **GASTRO-INTESTINAL DISORDERS.**—In that condition popularly known as “torpid liver,” when the stools are pale in color and have an offensive odor, showing an absence of bile; when the tongue is covered with a thick fur and the patient complains of headache, lassitude, loss of appetite, and a bad taste in the mouth, small doses ($\frac{1}{60}$ grain) of strychnine given two or three times daily will often act as well as a mercurial, restoring the bile and correcting the other symptoms.

In the vomiting of phthisis strychnine is one of the best agents at our command.

Epidemic diarrhœa and dysentery are frequently controlled by strychnine.

In acute and chronic alcoholism strychnine is a valuable remedy. The administration of small doses will control the morning vomiting and dyspepsia, will check the tremor of chronic alcoholics in the forming stage of delirium tremens, and will remove the depression due to abstinence from alcoholics. The hypodermic injection of $\frac{1}{30}$ to $\frac{1}{20}$ grain, three or four times daily for a week, or possibly two, will remove the craving for stimulants and counteract the vasomotor paralysis to which the injurious effects of alcohol are due.

In constipation due to atony of the muscular coat of the bowel strychnine is beneficial when added to purgative pills.

NERVOUS DISORDERS.—Strychnine is valuable in functional nervous atony or depression, but is harmful in organic disease during the period of acute inflammation or in acute infantile palsy.

In acute or subacute neuritis the use of strychnine is harmful, as the nerves are already inflamed.

In progressive lead palsy large doses of strychnine will check the progress of the disease; potassium iodide taken concurrently will hasten the elimination of the lead.

Amaurosis due to the excessive use of alcohol or tobacco is particularly amenable to strychnine. Beginning with $\frac{1}{40}$ grain, the dose may be gradually increased to $\frac{1}{8}$ or $\frac{1}{6}$ grain; improvement may not be apparent until the larger doses have been reached. Eye-strain from insufficiency of the ocular muscles may be relieved by strychnine. (See *NUX VOMICA*.)

After the occurrence of brain-lesions, strychnine may be employed to maintain the nutrition of the paralyzed limb; but, if palsy is due to a disease of the trophic cells of the cord, little benefit will result save the stimulation of the remaining cells. Used too early in cerebral paralysis, especially when due to hæmorrhage, it may do serious harm; and in the early stages of organic disease it may be decidedly harmful, especially in large doses.

In hemiplegia when degeneration has not set in and the paralyzed muscle is not completely relaxed, strychnine is an efficient remedy; it is of no avail in recent cases or when electrical contractility is lost. Strychnine should never be used during the presence of acute symptoms of congestion or inflammation of either the spinal cord or of its meninges.

In tremors and ataxic movements of

various kinds (but not in locomotor ataxia), and also in chorea, epilepsy, and idiopathic tetanus strychnine will be found of value.

Strychnine is highly efficient in many forms of neuralgia, especially visceral (gastralgia, hepatalgia, etc.), and also in infra-orbital and other neuralgias accompanying anæmia and general debility, in all of which small doses ($\frac{1}{100}$ grain) should be exhibited.

Hypodermic injections of very large doses of sulphate of strychnine are of value in *tic douloureux*. The injections, once a day, should begin with $\frac{1}{30}$ grain and be rapidly increased to $\frac{1}{8}$ or $\frac{1}{4}$ grain. Usually the injections should be discontinued after five or six weeks' usage, but repetition may be required once or twice again. On discontinuing the strychnine, iodide of potassium, nitroglycerin, or other drugs should be ordered. Rest in bed with freedom from care are enjoined during treatment. C. L. Dana (*Va. Med. Monthly*, May 22, '96).

Local paralysis and diphtheritic paralyses are amenable to strychnine internally administered.

PULMONARY DISORDERS.—In pneumonia, and in other acute diseases, threatened collapse may be averted by hypodermic injections of strychnine ($\frac{1}{30}$ to $\frac{1}{4}$ grain); the beneficial effect will be improved by the addition of atropine sulphate ($\frac{1}{150}$ to $\frac{1}{100}$ grain) to each injection. Habershon (*St. Bartholomew Hosp. Reports*, '86), Kidd (*London Pract.*, Sept., '94), and Hare (*Ther. Gaz.*, Apr., '95) testify to the value of strychnine in pneumonia.

Dyspnœa from any cause—winter cough or bronchorrhœa in the aged, emphysema, and phthisis—is relieved by strychnine.

The value of strychnine in the treatment of phthisis has been fully set forth by Thomas J. Mays, of Philadelphia

{*Jour. Amer. Med. Assoc.*, Oct. 10, '96; *N. Y. Med. Jour.*, Oct. 27, '96). He regards the state of the nervous system as an important factor in giving rise to pulmonary tuberculosis, and concludes that no drug compares favorably with strychnine in the treatment of this disease. He begins with $\frac{1}{30}$ grain, given four times a day; give this for a week and increase it to $\frac{1}{24}$ grain for another week; during the next give $\frac{1}{20}$ grain; the following week raise the dose to about $\frac{1}{16}$ grain; and so on until the signs of beginning strychnine intoxication appear (usually when $\frac{1}{12}$ or $\frac{1}{8}$ grain is reached). The object is to impress the nervous system with the full stimulant effect of this drug, keeping the strychnine up to the highest level of safety, but shunning the point where its stimulus extends into the region of tetanus or paralysis. At this point he reduced the dose from $\frac{1}{8}$ grain to $\frac{1}{16}$ grain and then gradually increases it again, alternately. Given in this way the symptoms and general condition of the patient will improve in every way.

Literature of '97-'98-'99.

The plan personally pursued in giving strychnine is as follows: As a rule, 1 grain is divided into thirty or thirty-two doses, and one dose administered four times a day. This lasts one week, and the following week $1\frac{1}{4}$ grains are divided and given in the same manner. After this, instead of increasing the drug a quarter of a grain, as in the first week, it is augmented to only an eighth of a grain every week until the line of toleration of the drug is approached. This is most often shown by slight twitching in a leg, by a tendency to stiffness of the lower jaw, or by a fullness in or drawing of the neck. After this a somewhat smaller dose is given for two weeks or a month, and then an effort is made to push it too near a point of physiological toleration; or a retreat is made to a point near the initial dose, and this is gradually increased until the line of

toleration is again in sight. The dose is diminished and the previous steps are repeated again and again.

The greatest value of strychnine lies not so much in its power of acting as a temporary expedient as it does in being a permanent stimulant to the flesh- and vigor- making functions of the body. Thomas J. Mays (*N. Y. Med. Jour.*, Oct. 8, '98).

SURGICAL SHOCK.—Strychnine is very valuable in the treatment of surgical shock. In severe cases as much as $\frac{1}{4}$ grain may be given by hypodermic injection.

Literature of '97-'98-'99.

Strychnine hypodermically in the dose of $\frac{1}{200}$ grain is valuable in the grave form of asphyxia neonatorum. After the administration of the strychnine accessory methods of treatment may be employed. Fry (*Amer. Jour. of Obstet.*, Apr., '98).

ANTIDOTAL USES.—Strychnine is a valuable antidote in poisoning by chloral, physostigma, and opium, in the latter case being better than belladonna. It is also useful in all cases of narcotic poisoning, where respiratory failure is imminent or present. In chloroform poisoning the hypodermic injection of $\frac{1}{10}$ grain is advised, and this to be repeated in ten minutes if no effect has been produced.

C. SUMNER WITHERSTINE,
Philadelphia.

SULPHONAL.—Sulphonal (sulfonal, di-ethyl-sulphone-di-methyl-methane) is obtained from anhydrous acetone by anhydrous ethyl-mercaptane with a stream of dry hydrochloric-acid gas. It occurs in thick, tasteless, odorless, colorless prisms, soluble in 65 parts of cold and in 2 parts of boiling alcohol, in 135 parts of ether, in 500 parts of cold and in 15 parts of boiling water. Sulphonal is not affected by any of the ordinary acids, alkalies, or oxidizing agents either in the

cold or when warm, and is a very stable compound. This substance was introduced by E. Baumann in 1886, and clinically reported upon by A. Kast in 1888, as an hypnotic in doses of from 15 to 45 grains. On account of its insolubility and slow rate of absorption when given in capsules or suspended in mucilage or simple elixir, it has been suggested that it be administered in hot broth, coffee, or milk. Stewart suggests that at bed-time the sulphonal be completely dissolved in boiling water, and drunk as soon as it has been cooled to a temperature which can be borne, before precipitation occurs. This solution may be flavored with *crème de menthe*.

Physiological Action.—The symptoms produced by sulphonal in man by even large therapeutic doses are simply quiet sleep, without any disturbance of digestion, pulse, or temperature, out of which the patient wakes after some hours in his normal condition, or occasionally with a certain amount of giddiness and lack of mental tone. It seems doubtful whether any single dose of sulphonal will cause death in the robust adult; certainly enormous doses have been taken and survived (Wood). Kast affirms that the blood-pressure is not altered by doses which produce sleep, and in the experiment of William F. Shick, of Easton, Pa., there was even pronounced rise of the arterial pressure, the cause of which was not determined; as no experiments were made upon curarized animals, the rise in the blood-pressure may have been produced by the failure of respiration (Wood). Shick states that sulphonal in moderate doses produced relaxation of the muscles and a staggering gait, but had no influence upon the motor or sensory nerves nor upon the muscles.

The reflex activity is markedly diminished by sulphonal, which is prob-

ably a direct depressant to the spinal cord; but Shick states that in some of his experiments the reflex activity was increased, and that the decline of the reflexes is, in fact, due to stimulation of Setschenow's centre. Kast found neither microscopical nor spectroscopical blood-changes in animals acutely poisoned by sulphonal. When taken in large amount, sulphonal is eliminated, in part by the kidneys unchanged, but the greater portion of it appears to be eliminated, according to Smith, of London (London Pract., Jan., '89), in the form of an organic sulphur compound, probably ethyl-sulphonic acid. The same experimenter found that moderate doses increased the amount of urea and the quantity of urine excreted, but to so slight a degree that it does not appear that in such doses the destruction of nitrogenous tissue is materially affected. The phosphates in the urine are said by some observers to be increased by small and decreased by large doses of this drug. The color of the urine is apt to be changed to a reddish brown by the presence of a coloring matter which is closely allied to and has been generally supposed to be identical with hæmatoporphyrin. The two substances are identical by almost every test, but the spectroscope reveals a difference.

W. Morro (Deut. med. Woch., No. 34, '94) concludes from experiments that sulphonal is not destroyed in the organism, but is eliminated in the urine, from which it can be separated in a crystalline condition. The quantity eliminated increases day by day while it is being administered, and, in general, if its use be discontinued, three days must elapse before the sulphonal accumulated in the body will be eliminated.

This drug, therefore, has a cumulative and prolonged action. It would

seem that sulphonal chiefly, if not wholly, affects the cerebral centres, and a large number of the symptoms produced—such as somnolence, stupor, disinclination to mental or physical effort, muscular weakness, inco-ordination and paresis, diplopia, aphasia, and slow and weak respiration and pulse—may be explained by the theory that the irritability of the central nervous system is obtunded by its action (M. L. Foster).

Poisoning by Sulphonal.—Disagreeable after-effects have followed the use of sulphonal in ordinary therapeutic doses. In the report of the Therapeutic Committee appointed by the British Medical Association to investigate the utility of various hypnotics these untoward effects are summarized as follows:—

“In 6 out of 10 cases in which 20 grains had been given disagreeable after-effects were noted: drowsiness next day was noted 6 times, giddiness 4 times, and headache and inco-ordination of gait each twice. In 4 cases where 10 grains has been given drowsiness was noticed once; in 5 cases with 15 grains drowsiness was noticed twice and giddiness twice; with 25 grains (4 cases) drowsiness was noticed twice, giddiness once, headache once. In 7 cases with 30 to 60 grains drowsiness was noticed 4 times, giddiness twice, inco-ordination of gait and vomiting each once.”

Although sulphonal is claimed by many to be an absolutely safe hypnotic, there are numerous cases of death on record, some as the result of moderate doses. The most striking of these, perhaps, is reported by Pettit (*Med. News*, Aug. 10, '89). A woman, 28 years old, suffering from melancholia and hysterical manifestations, but not known to have any organic disease, took 30 grains of sulphonal in two equal doses, an hour and a quarter apart. She slept for 12

hours and then could be roused and could swallow, but somnolence increased for the next 12 hours. The pupils began to contract 18 hours after the last dose. At the end of 40 hours the temperature began to rise, and the patient died in spite of active treatment.

Rehm (*Berl. klin. Woch.*, No. 16, '89) reports a case in which a patient narrowly escaped death as the result of taking 18 grains for three successive days. Reinfuss (*Wiener med. Blatt.*, Jan. 7, '92), Stern (*Wiener med. Woch.*, No. 10, '94), Herting (*Allg. Zeit. f. Psych.*, B. 51. H. 1, '94), and others report fatal cases. The cases of Stern and Herting were instances of chronic poisoning; they had been under treatment for some time, and has been apparently benefited by the drug up to the time of the appearance of the toxic symptoms.

Literature of '97-'98-'99.

The recorded cases of sulphonal poisoning have been in women for the most part. Among twenty-one cases, Schulz found that twenty were in women, and all observers have found that the victims of sulphonal poisoning were anæmic to a certain degree. The inference seems reasonable that certain conditions of the blood, such as chlorosis, have a direct connection with the supervention of toxic phenomena under the use of sulphonal. Pollitz (*Wiener klin. Woch.*, June 9, '98).

The various symptoms of sulphonal poisoning, though all are not usually present in any one case, are: drowsiness, stupor, muscular inco-ordination, incapacity for physical or mental exertion, tinnitus aurium, headache, vertigo, partial loss of the reflexes, nausea, vomiting, constipation, sometimes diarrhœa, ataxic nervous troubles, diplopia, muscular tremor or paresis, ptosis, œdema of the eyelids, slow and weak (possibly stertorous) respiration, slow pulse, elevation of temperature, general anæsthesia, red-

dish-brown urine, urine diminished or suppressed, aphasia, and cyanosis. Death results from failure of respiration preceded by deep unconsciousness. In several fatal cases motor paralysis appeared to be the most prominent symptom (Foster).

Treatment of Poisoning by Sulphonal.

—Recovery is usually most rapid in the non-fatal cases of poisoning, if the patient is thoroughly purged (Foster). Great good has seemed to have been produced by the free use of warm water, which should be given as largely as can be taken by the mouth, and also by injection into the rectum, with the hope of flushing the kidneys and aiding them in throwing off the poison (H. C. Wood).

Literature of '97-'98-'99.

The most important point in the treatment of poisoning from the disulphones is the prophylaxis. It is not an uncommon practice for the sick woman to be given a prescription for sulphonal to be taken at her own discretion, the doctor, perhaps, not seeing the patient for several weeks at a time. Such a course seems most reprehensible, considering the insidiousness of the onset of the intoxication and the fatal results when once the poisoning is established.

Another important precaution to be adopted is to see that the poison is not allowed to accumulate in the body. Simply stopping the remedy for a few days will not suffice. The interruption should be for at least one week, and the intestinal canal should be thoroughly cleared out. In chronic sulphonal poisoning after the discovery of the trouble the poison is to be stopped immediately and absolutely; if an hypnotic is necessary, morphine, combined with hyosine, or small doses of chloral may be given. The first thing to be done is to empty the bowels thoroughly and promptly. The importance of this cannot be too strongly insisted on.

After emptying the bowels the most promising treatment of disulphone in-

toxication is that of Müller. Sodium bicarbonate formed the chief reliance of this investigator; but any other antacid, as magnesium carbonate, may be employed. Large amounts of water should be introduced into the circulation, both by the intestinal tract and by the subdermal tissues, in order to aid the elimination of the poison. The convalescence is likely to be very slow, often lasting several months. H. C. Wood, Jr. (Merck's Archives, Nov., '99).

Therapeutics.—Sulphonal is a powerful hypnotic, having little or no analgesic effects and ranking below chloral in power and certainty of action and above paraldehyde. It will sometimes succeed when the other hypnotics fail.

In functional nervous insomnia sulphonal is valuable as an hypnotic except when the presence of advanced organic disease of the heart is the cause of the wakefulness, in which case it is dangerous. When sleeplessness is due to pain, sulphonal is generally useless. In the insomnia of insanity it generally acts well, producing sleep by night and quietness during the day.

Sulphonal has been suggested as a remedy in epilepsy, hiccough, chorea, and nocturnal cramps on account of its action upon the reflexes.

In phthisis 8 grains of sulphonal are said to prevent night-sweats as effectively as atropine, and to exert this effect for a longer time.

In diabetes it has been found to cause a diminution of the sugar in the urine; but the effect is only temporary, as the sugar reappears upon the withdrawal of the drug.

Bad results have followed the use of sulphonal in angina pectoris; it is contra-indicated in that disease, and also when there is any congestion or inflammation of the kidneys.

C. SUMNER WITHERSTINE.

Philadelphia.

SULPHUR.—Sulphur is a non-metallic, solid element found native in the western United States, Mexico, Iceland, and in the West Indies, but more abundantly in Sicily and Italy, whence the commercial supply chiefly comes. It is widely distributed in nature, in the neighborhood of extinct volcanoes and in combination with metallic bases as sulphides, especially copper and iron pyrites. It is an important constituent of certain native mineral springs which furnish sulphurated waters. When fused and cast into rolls or cylinders it is popularly known as brimstone. As it occurs in nature, it forms yellow, transparent, rhombic crystals. Sulphur emits a peculiar odor when rubbed, and has a very faint taste. It is insoluble in water, but soluble in benzin, benzene (benzol), turpentine, ether, chloroform, carbon disulphide, the fixed and volatile oils, and in boiling alkaline solutions. Sulphur should never be triturated with any chlorate, as they form an explosive mixture.

Sulphur *per se* is official in three forms: sublimed, precipitated, and washed sulphur. The iodide (containing 20 per cent. of washed sulphur and 80 per cent. of iodine), crude sulphurated lime, and sulphurated potash are also official.

Washed sulphur (sulphur lotum, U. S. P.) occurs as a fine, yellow, dry powder, without odor or taste.

Precipitated sulphur (lac sulphuris, or milk of sulphur; sulphur præcipitatum, U. S. P.) occurs as a fine, amorphous, pale-yellow powder.

Sublimed sulphur (flowers of sulphur; sulphur sublimatum, U. S. P.) occurs as a fine, yellow powder, having a faint odor.

Iodide of sulphur (sulphur subiodide; sulphuris iodidum, U. S. P.) occurs in

grayish-black masses, having a metallic lustre and the odor of iodine. It is soluble in carbon disulphide, and in 60 parts of glycerin. It should be kept cool and in glass-stoppered bottles.

Sulphurated lime (calcic liver of sulphur; liver of lime; calx sulphurata, U. S. P.) occurs as a grayish-white powder, having the odor of sulphurated hydrogen, and an unpleasant alkaline taste. It is soluble in glycerin, and in boiling water with partial decomposition.

Sulphurated potash (so-called "potassium sulphide; liver of sulphur; potassa sulphurata, U. S. P.) occurs as a hard, brittle, brownish substance, having a faint, sulphurated-hydrogen odor, and a bitter, alkaline taste. It is soluble in 2 parts of water, and is incompatible with acids, alcohol, etc. Even carbon dioxide precipitates sulphur from it in solution.

Preparations and Doses.—Sulphur lotum (U. S. P.), 15 to 90 grains.

Pulvis glycyrrhizæ comp. (U. S. P.), $\frac{1}{2}$ to 2 drachms. (See LICORICE.)

Unguentum sulphuris, U. S. P. (washed sulphur, 30 per cent.).

Sulphur præcipitatum (U. S. P.), 15 to 90 grains.

Sulphur sublimatum (U. S. P.), 1 to 3 drachms.

Sulphuris iodidum (U. S. P.), 1 to 4 grains.

Calx sulphurata (U. S. P.), $\frac{1}{10}$ to 1 grain. (See CALCIUM.)

Potassa sulphurata (U. S. P.), $\frac{1}{2}$ to 5 grains.

Physiological Action.—Sulphur has little or no effect when applied locally, but combination with fats, as in ointment, makes it at once active; inflammation of the skin may follow its continued use in concentrated form. Taken internally it is dissolved by the alkaline in-

testinal juices, to some extent, and absorbed. It has been detected in the milk, sweat, urine, and even the breath of persons taking it. It is supposed to undergo oxidation in the system. In sufficient quantity, sulphur acts as a mild laxative, producing soft, semiliquid, feculent stools, accompanied with considerable sulphurated-hydrogen gas. Its continued use has probably an effect upon nutrition: the secretions generally are increased. It appears to have an especial action upon the skin and mucous membranes.

Poisoning by Sulphur.—Poisoning by this drug is rare, but poisonous effects have been observed from the ingestion and from the external use of sulphur. The symptoms of poisoning are nausea, dysentery, tonic contraction of the muscles of the extremities, the appearance of fever, and painful urination. In one case there was extreme prostration, a sulphurous breath, clammy perspiration, vomiting and purging, and intestinal colic. Such symptoms of irritant poisoning are due, without doubt, to the presence in the sulphur of a large quantity of sulphuric acid (H. C. Wood). The treatment of such poisoning would be that of poisoning by sulphuric acid: the administration of chalk, magnesia or soap with demulcent drinks, and opium to allay pain and control peristalsis.

Therapeutics. — **GASTRO-INTESTINAL DISEASES.**—Sulphur has been used as a laxative in cases of hæmorrhoids and intestinal obstruction on account of the pulpy, soft stools which it induces. It is also a favorite laxative in cases of chronic rheumatism.

In diarrhœa with offensive watery stools of scrofulous children and in dysenteric diarrhœa, minute doses of sulphur have been beneficial.

In disordered or suspended hepatic

function sulphur, in doses of 5 to 20 grains, has restored that function.

Biliary colic due to impacted gall-stones has been relieved by daily doses of 5 grains.

LITHÆMIC DISORDERS.—Sulphur has been used largely in the treatment of rheumatism and gout. In lumbago and sciatica the flowers of sulphur may be applied to the affected part, retained by a suitable bandage. It may also be applied as a thick paste for the relief of sciatica, as suggested by de Mussy: one night's use generally suffices. In muscular rheumatism small doses of sulphur are advised, in conjunction with iodine or arsenic.

RESPIRATORY DISORDERS. — Insufflations of powdered sulphur have been advised as an efficient remedy in croup.

Chronic bronchitis, in many cases, is amenable to sulphur. G. Sée recommends the following: Precipitated sulphur, 50 grains; extract of belladonna-leaves, 1 grain; Dover's powder, 5 grains; sugar, 20 grains; to be dispensed in ten capsules, two to ten being taken daily as required.

Literature of '97-'98-'99.

The following are indications for the use of sulphur-waters: 1. Chronic catarrh of the respiratory organs, dependent more upon venous hyperæmia and unaccompanied by any special complication. 2. Circulatory disturbances in the abdomen and the gastric and intestinal disorders evoked by them. 3. Various exudative processes in joints, muscles, and bones, defective callous formation after fractures, chronic periostitis, caries, and necrosis, callous ulcers, tendo-vaginitis, and deficient mobility after various injuries in which surgical interference is not indicated. 4. Chronic phlebitis, periphlebitis, and inflammations of the skin. 5. Various forms of chronic rheumatism, gout, and rheumatic and nervous paralyses. 6. Metallic poi-

soning, especially by lead and mercury, and its after-effects. 7. Syphilis, sciatica, and neuralgia. Partes (Wien. med. Presse, No. 49, '97).

In diphtheria insufflations of sulphur have been used with apparent benefit.

Literature of '97-'98-'99.

Sulphur dioxide easily kills the diphtheria bacillus whether in a dry or moist condition, but it is not to be relied upon for more resistant organisms. F. J. Allan (Treatment, Sept. 8, '98).

CUTANEOUS DISORDERS.—In scabies sulphur ointment is one of the best remedies. It should be well rubbed into the affected parts, after previous scrubbing with soap and hot water.

Literature of '97-'98-'99.

Sulphur-waters are useful externally in scabies, acne, furunculosis, and hyperidrosis; internally, to stimulate the glands of the alimentary canal and to increase the biliary secretion. They are especially indicated in so-called abdominal plethora, hyperæmia of the liver and chronic gout, in rheumatism, rheumatoid arthritis and chronic catarrhal conditions of the alimentary canal, the bronchi, and the throat. W. Page May (Practitioner, Nov., '98).

In tinea tonsurans sulphur ointment is efficient after clipping the hair.

Seborrhœa, sycosis, chronic eczema, and psoriasis are benefited by small doses of sulphur. Inveterate forms of eczema, psoriasis, impetigo, and prurigo are improved by the fumes of burning sulphur.

In erysipelas, measles, and small-pox sulphur ointment will allay the heat and congestion and in small-pox will disinfect the pustules.

In diseases of the nails, when they have become brittle, and covered with ridges and white spots, internal use of sulphur in small doses will frequently

bring about a healthy and polished appearance.

Sulphur in small doses will often increase the activity of the hair-forming apparatus in cases of alopecia.

In skin diseases accompanied with infiltration the use of the iodide in a 6-per-cent. ointment is indicated.

In scaly skin diseases, sulphurated potassa is useful, 1 to 3 ounces being dissolved in 15 gallons of water, for a bath.

In suppurative diseases, in acne, boils, glandular enlargements, etc., calx sulphurata in small doses will do good.

In young women who suffer from acne, particularly about the menstrual period, the skin becoming at this period sallow and muddy, Ringer recommends the following lotion as one which is usually curative: Sublimed sulphur, 1 drachm; glycerin, 1 drachm; rose-water, 8 ounces; apply as a wash once or twice daily.

CHLOROSIS.—In chlorosis when iron is not well borne or has failed, sulphur has in many cases improved the general condition, so that iron could be used with success later.

MENINGITIS.—The antizymotic and antiseptic properties of sulphur have been long known. When sulphur is ignited it gives off dense fumes of sulphurous-acid gas, which are known for their bactericidal action. The fumes of sulphur dioxide destroy the germs of cholera, typhoid fever, diphtheria, glanders, and tuberculosis. The disinfecting qualities of this gas have been utilized by sanitary authorities to disinfect rooms that have been occupied by patients suffering from infectious or contagious diseases. Prolonged action of the pure gas may destroy germs even in a dry atmosphere, but the presence of moisture increases its efficacy. Three pounds of sulphur, moistened with alcohol,

should be laid in a pan which rests on a support in a tub of water to prevent fire. Infected ships may be treated in the same way.

C. SUMNER WITHERSTINE,
Philadelphia.

SUPRARENAL CAPSULES, DISEASES OF.—The disorders of these organs other than Addison's disease have, as yet, received but little attention.

Hæmorrhage into the suprarenal capsules may occur in the course of infectious diseases.

It is also observed in newborn children.

Tuberculosis of these organs is not uncommon as a complication of tuberculous disease elsewhere in the organism. (See ADDISON'S DISEASE, volume i.)

Tumors.—Yellowish adenomata are often observed in these organs; fibromata and lipomata occasionally.

Malignant tumors are rarely observed, but, as recently shown by Ramsay (Bull. Johns Hopkins Hosp., Jan.-Mar., '99), after a study of sixty-seven cases, they should be borne in mind in the presence of an abdominal tumor.

SYMPTOMS AND DIAGNOSIS.—The main symptoms of malignant growths are rapid loss of strength, debility, emaciation, digestive disorders, and abdominal pain, with skin-changes in some cases. These are fairly distinct in some cases; in others no symptoms point to a suprarenal origin. A differential diagnosis must be made from other suprarenal diseases, renal and hepatic tumors, diseased retroperitoneal glands, and cysts and growths of the pancreas. The prognosis is always serious.

Literature of '97-'98-'99.

The symptoms of malignant neoplasm of the suprarenal gland in some respects

suggests Addison's disease, but the resemblance is not marked, and the skin-changes and disturbances of the circulatory system are generally absent. Tuberculosis, the writer believes, with Leva, is more apt to involve the sympathetic; hence more apt to cause bronzing. The most frequent symptom (only 37 cases were available for study in this respect) was marked and progressive loss of strength—seen in 22 patients—accompanied in many by extreme languor and debility. Emaciation was present in 20. In 12 cases out of the 37 nausea and vomiting occurred; in 9 there was loss of appetite, diarrhœa in 4, and constipation in 5. The circulatory system was rarely involved. Though there was extension of the growth in the vena cava and thrombosis in 4 or 5 cases, they did not suffer from œdema. Pain existed in 25 cases; in some it was referred to the renal regions behind; in others it occupied the whole back; in some it was in the epigastrium or hypochondrium. Three out of the 37 showed distinct bronzing of the skin; in 2 there was a peculiar profuse growth of hair. The temperature was usually normal, and not, as Berdach has claimed, subnormal. In 13 out of the 37 cases the growth caused no symptoms referable to the suprarenal. O. Ramsay (Bull. Johns Hopkins Hosp., Jan., Feb., Mar., '99).

ETIOLOGY AND PATHOLOGY.—According to Rolleston (Amer. Jour. Med. Sci., Oct., '98), the anatomical characters of malignant growths are often hæmorrhagic, with a tendency to break down in the centre and form a pseudocyst. Sarcoma is the more frequent form, having been present in fifteen of twenty-four cases studied by him. Men are somewhat more frequently affected than women (Ramsay).

TREATMENT.—Operative procedures proved successful in two of Ramsay's cases, the principal difficulties met with being the friability of the tumor, the great tendency to hæmorrhage, and the frequency of adhesions.

SURGICAL DISEASES.

Traumatic Fevers.—Traumatic fever is a term applied to those constitutional disturbances which accompany the process of healing and which are dependent upon the nature of the changes taking place in the wound. If there be an absence of suppuration (primary union), the term *primary wound fever* is applied; if suppuration be present (healing by granulation), the disturbance is called *secondary wound fever*.

Primary Wound Fever.—Two types of primary wound fever are observed: (1) *aseptic fever*, and (2) *traumatic, or surgical, fever*.

ASEPTIC FEVER.—In the healing of aseptic wounds there is an absence of inflammation. There is, however, a slight febrile movement, the temperature rising 3 or 4 degrees above normal and not returning again for a period of from two to four days.

There are but few symptoms, other than the febrile movement, in this variety of fever. There is usually an absence of malaise and delirium. The patients feel well and are able to sit up or be about the room.

Aseptic fever may be present during the healing of simple fractures, in undrained wounds, and all wounds—large or small—which heal by first intention. It is believed to be caused by the absorption of pyogenic substances derived from the broken-down tissue and blood-clot, which latter contains a substance known as fibrin-ferment. Fibrin-ferment causes a general coagulation of blood in the vessels and death, when injected into animals.

Aseptic fever calls for no treatment, as it is of short duration and of slight severity.

TRAUMATIC, OR SURGICAL, FEVER.—This fever was well known before the

advent of the antiseptic treatment of wounds, as more or less inflammation was considered as one of the necessary features of normal wound-healing even in the absence of suppuration. It may be observed during the healing of wounds which have not received antiseptic treatment, especially where the wound is the result of an injury or is the seat of septic infection.

Symptoms.—The constitutional symptoms depend largely upon the condition of the wound and upon the degree and extent of the inflammation. A marked rise of temperature may be observed in twenty-four to forty-eight hours after operation or injury, accompanied by a rapid pulse; hot, dry skin; furred tongue; scanty, high-colored urine; and, at times, a mild delirium. The patient usually feels very warm and restless and complains of great thirst. The thermometer will usually indicate a temperature of 102° F., or more, on the evening of the second day. The following morning the temperature will be slightly lower, but by evening it will have risen as high as, or higher than, on the preceding night. On the third or fourth day suppuration is established, and the wound becomes clean and filled with granulations, which prevent the absorption of the pyogenic or fever-producing substances, and thus causes the temperature to decline. The other symptoms disappear with the decline in temperature. The duration of traumatic or surgical fever is from seven to ten days.

Etiology.—This form is believed to be due to the absorption of ptomaines which result from a fermentative process induced by the presence of bacteria in the secretions of the wound. Very few, if any, bacteria are found in the blood during this fever. When free discharge is established in the wound, the ptomaines

are no longer absorbed, the temperature falls, and the symptoms improve. Septic inflammation may result from the infection of retained secretions, from the growth of bacteria in the track of one or more sutures forming a stitch-abscess, or from too great tension upon the lips of the wound.

Treatment.—A high temperature associated with the other symptoms of fever should lead to the examination of the wound, as to its condition and the presence or absence of bacterial infection. All infected areas should be evacuated, and infected stitches removed. If much inflammation be present and the lips of the wound are red, swelled, and tender, the wound should be cleansed with an antiseptic solution (peroxide of hydrogen, sublimate, etc.), and drainage-tubes inserted, or be reopened and moist antiseptic dressings applied. The condition of each wound will determine the amount of interference necessary. The administration of nervous sedatives or opiates may be required for the relief of pain and insomnia.

Secondary Wound Fever.—This form of fever, sometimes called suppurative fever, occurs after suppuration is established, and is more marked when there is greater or less retention of the pus.

SYMPTOMS.—The constitutional disturbance, when suppuration takes place in a wound, is usually profound. There is a sudden and marked rise of temperature which may be preceded by a chill. If the abscess is confined to the wound, the pus may be easily liberated; but, if infection of the surrounding connective tissue has occurred, the pus may burrow in various directions, usually along the lines of least resistance, which will necessitate the making of a number of counter-openings in order to check the sup-puration. The inflammation may be-

come subacute, or chronic, and continue for many weeks. In this case the fever becomes remittent in character, with evening rise and morning fall to normal, like hectic fever, which is a suppuration fever accompanying tuberculosis. Marked prostration, with weak, rapid pulse, and emaciation are present if the suppurative fever continue long. Diarrhoea and night-sweats are often present; septic poisoning or exhaustion may lead to a fatal issue unless the suppuration is checked. If the type be more chronic (lasting for months), emaciation will be more gradual, and amyloid degeneration of the kidneys, liver, and other internal organs, and enlargement of the lymphatic glands may take place.

DIAGNOSIS.—If the temperature does not fall at the end of a few days after the beginning of the healing process, but remains high or ascends higher, it may be assumed that pus has formed in the wound.

ETIOLOGY.—This fever is due to the absorption of ptomaines, or a chemical poison, developed as a result of a fermentation induced by the presence of pyogenic bacteria. The bacteria are not always to be found in the blood or tissues, and a decline of the temperature immediately follows the evacuation of the pus. There is no progressive infection of the system, as in pyæmia.

PROGNOSIS.—The prognosis is generally favorable except when the fever is associated with tuberculosis, in which case it is very unfavorable.

TREATMENT.—In acute suppuration, evacuation of the pus, thorough disinfection of the wound and all tracks of sup-puration, and the complete removal of infected granulations by means of the curette are indicated. Where joints are involved, resection must be considered, except when amyloid degeneration of the

kidney is present (shown by examination of the urine), in which cases amputation may offer a chance for prolonging the life. In all cases a nutritious diet and a liberal use of stimulants are especially needed. Fresh air, and plenty of it, is a great restorative. If the weather permit, the patient may be placed in a tent or out in the open air with great advantage.

Traumatic Delirium.—This term is applied to those forms of delirium which occur as the result of injury, and are not due to alcoholism, pyrexia, or the effects of anæsthesia.

SYMPTOMS.—This condition is usually marked by some præcordial distress, accompanied by oppressed and sighing respiration. The pulse is soft and compressible, but exceedingly rapid and bounding. The face is flushed. The tongue is moist and tremulous, and the skin is moist. There may be vomiting. The principal feature of this condition, however, is a peculiar delirium, very closely resembling that of delirium tremens; and in many cases the resemblance is so close that it is often quite impossible to draw the line between the two conditions. There are the same brightness of the eye, heat of the head, constant and irrepressible muscular action, and sleeplessness with wandering delirium and rapid succession of spectral delusions, usually of a frightful and painful character (Ashhurst). In some cases the delirium is of a mild character, the patient being haunted with extravagant ideas; in other cases the patient tries to get out of bed, and attempts to injure his attendants and soon becomes furiously maniacal (Druitt).

DIAGNOSIS.—This condition resembles in many points the effect of pyæmia, and cannot always be distinguished from it; fortunately the treatment of both is

similar. Its resemblance to delirium tremens has been noted.

ETIOLOGY.—This condition is most frequently seen in persons of middle age and intemperate habits, and in children after capital operations. In severe traumatic fever delirium may be present. Severe burns, scalds, facial erysipelas, and cerebral lesions are liable to be accompanied by delirium. The seat of delirium is in the cortical gray matter of the brain. In some cases the delirium is caused by cerebral anæmia due to loss of blood.

PROGNOSIS.—The prognosis will be very unfavorable if the excitement is violent, as that soon leads to coma and death. If the pulse becomes more tranquil and firm, there will be some hope, especially if the patient sleeps. It sometimes happens that the mental disturbance becomes permanent.

TREATMENT.—The indications are to lessen the excitement, promote sleep, and support the vital powers. All local sources of irritation should be removed, ice applied to the head, and bromides and hypnotics administered. If the delirium is due to cerebral anæmia from loss of blood, stimulants may be freely given. Opium, generally not well borne, should be given in repeated small doses ($\frac{1}{4}$ to $\frac{1}{2}$ grain every hour or two), if at all, especially if the restlessness and debility are very great; a large single dose (2 to 3 grains) may be required, and should be reserved for violent cases not amenable to other means. Beef-tea, milk, and other fluid nourishment may be given. Alcoholics may be freely given if the patient is an habitual drunkard. Mild aperients are often indicated. In mild cases the symptoms will subside in a day or two, if a moderate supply of stimulants be given.

Malignant Edema.—This condition—known also as “gangrenous emphysema,”

"*gangrène gazeuse*," and "*gangrène foudroyante*"—is a rapidly-spreading gangrenous inflammation characterized by a distension of the affected tissues with the gaseous products of decomposition, due to infection by a special micro-organism. (See WOUNDS, SEPTIC; AND GANGRENE.)

SURGICAL DISEASES OF THE SKIN AND ITS APPENDAGES.

Milium.—Milium (grutum; strophulus albidus) is a cutaneous disorder characterized by the formation of small, roundish, whitish or pearly, sebaceous, non-inflammatory elevations, situated just beneath the epidermis, which are formed by the accumulation of inspissated sebum in ducts, the outlets of which have become occluded. They are mainly found on the face, eyelids, and foreheads of elderly persons; may exist in large numbers; and vary in size from a pin's head to a small pea. They may undergo calcareous degeneration, giving rise to cutaneous calculi. They differ from comedo in that the contents of the distended duct cannot be squeezed out until an opening is made. This affection is often associated with comedo and aene.

TREATMENT.—A small incision over the elevation will afford an exit through which the contents may be expressed by squeezing. After evacuation the interior should receive an application of lunar caustic (solid stick) or of tincture of iodine. If the general health be impaired, iron, strychnine, and codliver-oil are indicated.

Sebaceous Cysts, or Wens.—A wen (steatoma) is a cystic tumor varying in size from a millet-seed to an orange, formed by the retention of secretion in a sebaceous gland, and situated in the skin or subcutaneous structures. Wens occur most frequently on the scalp, face,

back, and scrotum, and may be single or multiple. There is usually no alteration in the skin lying over the tumor; if the tumor be large, the overlying integument may be somewhat thinned and have a glazed appearance. Although the excretory duct of the distended gland is usually obstructed, an opening may persist large enough to admit a probe. The contents of these tumors are milky or cheesy in character, but, if the tumor be injured, inflammation and ulceration may follow, or in the aged the tumor may acquire a malignant character, degenerating into epithelioma.

TREATMENT.—A cure will be effected by making an incision in the skin down to the cyst and carefully dissecting out the cyst. Incision and evacuation of the contents are always followed by a return of the tumor.

Molluscum Contagiosum.—This affection, known also as molluscum epitheliale and molluscum sebaceum, is characterized by the formation of sessile or pedunculated tumors varying in size from a pin's head to a marble. They are yellowish white or pinkish in color, rounded or acuminate, imbedded within or projecting beyond the surface of the skin, and have usually a dark-colored point at the apex, from which, on pressure, can be expressed a milky, curd-like, or cheesy substance. At first the lesions are quite firm, but they soften with age. After persisting for several weeks, they slough and disintegrate, or undergo slow absorption. The tumors give rise to no pain, are always discrete, may be single or multiple, and occur usually in children or young adults upon the eyelids, face, neck, breast, and genitals. This disease frequently affects several members of the same household, asylum, or school.

The color, the wax-like appearance, the umbilication, and the central aper-

ture are the diagnostic features. From molluscum fibrosum it is distinguished by the absence of the central black opening in the latter and the more general distribution.

The disease is probably contagious, and is said to be due to a parasitic protozoön of the coccidium type.

The prognosis is favorable, though the disease may persist for months or even years.

TREATMENT.—Thorough inunctions with white precipitate or sulphur ointment are efficacious in some instances; when they are not, each tumor should be incised, its contents removed, and the remaining cavity cauterized with nitrate of silver. General tonics (iron, arsenic, and strychnine) are often indicated.

Furuncle.—Furuncle (furunculus; boil) is a local inflammatory affection of the skin, commonly involving a cutaneous gland or hair-follicle. It begins with painful induration, followed by heat, swelling, and inflammation; finally, the central portion of the skin dies and forms a slough, or "core," around which suppuration takes place, ending in the separation of the "core," the subsidence of inflammatory action, and the contraction and healing of the cavity by granulation, the whole process lasting from seven to ten days. If no suppuration take place, the affection is called a "blind boil." The favorite location of boils is upon the face, ears, neck, back, axilla, buttocks, scrotum, labia, perineum, and legs. They may be single or multiple, and may appear in "crops."

The symptoms of the affection are at first a local sense of irritation or discomfort, followed by a sensation of throbbing pain, which is often severe and lasts until suppuration and loosening of the slough have occurred, when it subsides. In some cases, the neighboring lymph-

glands become enlarged, and fever and other constitutional disturbance result.

The diagnosis of the affection is usually easy. It may sometimes be confounded with carbuncle. General appearance, single opening, and circumscribed character usually distinguish the boil.

Improper diet and hygiene, nervous depression, overwork, too free indulgence in greasy foods and gravies, and irregular action of the bowels, local irritation, friction, and prolonged poulticing predispose to this affection. The entrance of pus-cocci into the skin is the essential or exciting cause of this disorder. Single boils are usually the result of local irritation; their appearance in successive crops (furunculosis) is usually an indication of impaired health.

Literature of '97-'98-'99.

Nine cases of furunculosis in nurslings have been bacteriologically examined. These cases presented three varieties: 1. Subepidermic abscess. 2. Furuncles, properly so called. 3. Abscess of the subcutaneous tissue developing almost without inflammatory reaction. In the nine cases, from which 14 cultures of pus were made, the staphylococcus aureus was found 10 times, 3 times the same organism associated with a small number of staphylococci albi, and once the latter organism alone. Therefore it is concluded that the furunculosis of nurslings is a staphylococcic infection of the skin. Friedjung (Archiv f. Kinderh., B. 24, S. 375, '98).

TREATMENT.—Removal of the cause and regulation of the diet claim first attention. Open-air exercise and tonics are useful in debilitated subjects. Strong ammonia, caustic potash, acid nitrate of mercury, and other forms of caustic have been used to abort in the early stage. Yeast, nuclein, quinine, and mineral acids have been given to prevent recurrence. Arsenic, with or with-

out iron, is sometimes beneficial. The sulphite or hyposulphite of soda (15 to 30 grains every three hours), calx sulphurata ($\frac{1}{8}$ grain every two or three hours), or sulphur may be given internally. A solution of boric acid or of sublimate, a 10-per-cent.-salicylic-acid ointment, or a mixture of equal parts of ichthyol and collodion may be applied locally. White has used full doses of bichloride of mercury internally to prevent recurrence.

Literature of '97-'98-'99.

Hypodermic antiseptic injections into the very base of a boil or carbuncle, early in its history, is practically an unfailing means for aborting an attack, however severe. If a boil is small, 1 injection, or 2 from opposite directions, carried well in from points on the outer margin of the indurated area are commonly sufficient to kill the morbid process. It is not usually necessary to repeat the injections more than once, although occasionally a second or even a third treatment may be necessary. By carrying the needle well into the middle of the boil, near the base, the injection will escape through the crown of the boil, if suppuration is well begun, and thus a larger amount can be used with safety than at the very outset, when less is needed. It is commonly practicable to wash out the cavity with a sharp-pointed syringe and an antiseptic solution daily after the first treatment, unless the boil was aborted at the very onset without perceptible suppuration or necrosis of tissues. The after-treatment consists in the application of cloths wrung out from hot, but weak, bichloride solution until the inflammation has disappeared, and all necrosed tissue has come away. Then a dry antiseptic dressing suffices. Lysol may be employed both for the hypodermic use and later dressing. In from twenty-four to forty-eight hours the pain from the boil or carbuncle is usually all gone, and active inflammation has ceased. William O. Stillman (*International Jour. of Surg.*, Aug., '99).

Carbuncle.—DEFINITION.—Carbuncle

(carbunculus; erroneously called benignant anthrax, or anthrax) is a hard, circumscribed, deep-seated painful inflammation of the subcutaneous tissue, accompanied by chill, fever, and constitutional disturbance, and attended almost always with circumscribed suppuration and the formation of a slough.

SYMPTOMS.—The local symptoms are heat and aching, with throbbing and great tenderness, which are often followed by pain and redness along the lymphatics of the part and pain and swelling in the nearest lymphatic glands. There is at first a chill, followed by a febrile movement, which is generally well marked, and often very severe. The constitutional symptoms resemble those of erysipelas very closely, and may be as severe as those of the severest forms of that disease, and the consequences may be fully as grave and fatal.

DIAGNOSIS.—The size of the inflamed area, flatness of surface, multiple openings or points of suppuration and extensive slough differentiate carbuncle from furuncle. Carbuncle is single, furuncle generally multiple.

ETIOLOGY.—A lowered vitality from any cause predisposes to this affection. It is especially common in diabetes. It occurs, however, in persons who appear to be otherwise in perfect health, and in those suffering from acne and other skin disorders. Local irritation, injury, friction, and the predisposing causes of furuncle may be etiological factors. Microbic infection is generally believed to be the exciting cause.

PATHOLOGY.—The morbid process is first discovered as a circumscribed thickening and hardening of the deeper layers of the skin, attended from the beginning, or at least very soon, by redness and a slight elevation of the skin, increasing more or less rapidly in thickness and

area, as well as in prominence, until, at the end of a few days, it has reached its full development. Its area is then more or less circular, varying in diameter from a half-inch to three or four inches or more. It is intensely congested, is surrounded with an areola of congestion and often considerable cedema, and forms above the surface a considerable elevation, which is sometimes conical, but more often flat, according to the size of the area involved, and presents on its surface a vesicle or group of vesicles, containing serum, blood, or pus. These vesicles soon rupture and discharge their contents, exposing, on the floor, a small round orifice, from which already a yellowish or grayish slough protrudes. The tissue between these orifices soon melts down and thus form an irregular excavation, the floor of which is formed by underlying sloughing tissue. The slough which is thus exposed has been gradually forming, and involves the deeper cutaneous structures and sometimes subjacent parts; it consists, mainly, of connective tissue soaked with pus, and resembles in appearance wash-leather. It becomes, in a short time, gradually loosened from its bed, and is discharged through the orifice which has formed over it, leaving an excavation which becomes filled with granulations. The inflammatory thickening of the tissues diminishes and the parts become healed, leaving a permanent scar. Carbuncles are most frequently found in the median line of the trunk behind from the neck down, the shoulders, and buttocks; more rarely in the lip, scalp, or abdomen. Carbuncle lasts from four to six weeks.

PROGNOSIS.—Carbuncle is especially dangerous when located on the scalp, abdomen, and upper lip; in these locations it is apt to occur in young people, and usually runs an acute course and, as

a rule, is fatal from pyæmia. The prognosis is grave when extensive and attacking the elderly, especially if complicated with Bright's disease or diabetes. The prognosis should always be guarded, even in the most hopeful cases. Death is not infrequent in the old and debilitated.

TREATMENT.—General tonics, like quinine and iron, with large amounts of nourishing food, are indicated. Opium or other anodynes may be required to relieve pain and procure rest. Stimulants should be given only when required.

In the early stage 10 to 20 minims of a 5- or 10-per-cent. solution of carbolic acid in glycerin may be injected into the central portion of the mass with the view of aborting the mischief. If seen later, firm compression by straps of adhesive plaster applied concentrically may be made, leaving the central orifice free for the discharge of sloughs and applying an antiseptic dressing over the straps.

Another plan, applicable in the early or late stage as well: Place patient under an anæsthetic; freeze the parts to make them friable; make one long incision or several crucial incisions through the mass; remove all sloughs and decaying tissue with a sharp curette; disinfect, drain, and suture, as in an incised wound.

Another method of treatment is the application of warm, moist, antiseptic dressings, covered with thin rubber cloth or oiled silk, removing sloughs as soon as loosened, and using iodoform, aristol, euophen, or similar antiseptic powder freely. The use of poultices is harmful, and should be avoided.

In carbuncle from 20 to 30 minims of a solution of pure carbolic acid in glycerin, in the proportion of 1 in 3 to 1 in 8, should be injected into the surround-

ing inflamed indurated tissues, and not into the slough itself. The injections are best made parallel to the edge of the carbuncle, from three to four separate punctures being made in each case. The needle of the syringe should be introduced about one inch, and as it is slowly withdrawn the injection is pressed out. The surface of the carbuncle is then dressed with hot carbolic-acid fomentations, 1 in 40, which must be continued until the slough is separated, which usually happens in a week or ten days. R. M. West (Brit. Med. Jour., Mar. 7, '96).

Literature of '97-'98-'99.

The treatment used during the last five years in fifty cases of carbuncle consists in injecting into the diseased tissues an 80-per-cent., or even 90-per-cent., solution of carbolic acid. At an early stage 2 or 3 drops may be sufficient, but later 15 to 30 drops are needed. The skin is rendered anæsthetic with ethyl-chloride, and then the hypodermic needle is passed into the carbuncle and a little fluid injected; the needle is then partly withdrawn and passed in a different direction, but only one puncture is made through the skin. One injection generally suffices for a cure, but a second or third may be required. Care should be taken not to inject into a blood-vessel nor to injure a nerve. The results are very good, and the relief from pain is rapid. Manley (Indiana Med. Rec., Dec. 16, '98).

Ethol, both for internal medication and as an external application, has been found of value in carbuncles. It is given internally in doses of a teaspoonful every two hours, until the healing has been completed, the interval between the doses being gradually prolonged. The local treatment consists in free incision and thorough evacuation of the pus-cavity by scraping. The wound is then carefully cleaned with peroxide of hydrogen and dressed with absorbent cotton saturated with ethol. This dressing should be changed every four to eight hours. Creel (Cincinnati Lancet-Clinic, Apr. 29, '99).

Lightning-stroke.—The atmospheric discharge of electricity known as light-

ning may assume one of two forms. In the form known as "chain," or "bolt," lightning, the electricity has an extremely high potential, and a stroke under such circumstances is invariably fatal when the discharge passes through a living body. The form known as "sheet" lightning is a "brush" discharge of low potential, and is harmless. Thus, any effect from instantaneous death to momentary unconsciousness may follow the receipt of a lightning-stroke, the effect depending upon the potential of the current received. Other effects may be produced, as burns, superficial or deep; or paralysis of special sense or of general motion and sensation.

TREATMENT.—The immediate indication in these cases is the relief of shock. External warmth, stimulants, frictions with stimulating lotions, and, perhaps, artificial respiration will relieve the effects of the shock. Any burns present will demand the ordinary treatment of such injuries. Galvanism and the internal administration of strychnine are indicated for the relief of the paralysis.

Frost-bite.—Frost-bite, or pagoplexia, is an effect of cold exerted upon the extremities of the body or exposed portions, as the nose, chin, ears, hands, and feet, the destructive effects being either direct or, as more generally happens, indirect from inflammation. It occurs, to an injurious degree, chiefly in aged or very young persons, or in persons of depressed vitality, the frost-bite and resulting gangrene being more due to the habitual low vitality of the extremities than to the low temperature.

SYMPTOMS.—In the first degree of frost-bite there is a feeling of stiffness, numbness, and tingling in the affected part. It is of a pale-bluish tint, and somewhat shrunken. In this state the vitality of the part is merely suspended.

not destroyed. When reaction sets in and the circulation of the affected part returns, a burning, tingling pain is felt, the part becomes red, and shows some signs of inflammatory action.

In the next degree the vitality of the part is completely destroyed, and it appears at first blanched, white, and icy cold; later, when reaction sets in, it becomes livid and shrunken; sensation and motion are absent. When the part has become thawed, gangrene manifests its presence; the reaction is violent, the part may become either swelled and discolored or may shrivel and contract, and then quickly become black and dry, and eventually separate by the formation of a line of demarkation around it. Gangrene, as an exception, may not set in for some time, the parts in the meanwhile appearing quite healthy; then discoloration will be noticed, at first a bluish color, next dark blue, then black.

PROGNOSIS.—With proper care and treatment, the vitality of a part actually frozen may be restored; unskillful treatment may favor gangrene even when the parts are not in a state of congelation.

TREATMENT.—The indications are to restore gradually the heat-producing powers of the part and at the same time to repress any excess of reaction. The patient should be placed in a cold room, without fire, and the frost-bitten parts gently rubbed with snow, or cloths dipped in ice-water, and held between the hands of the operator; as reaction appears, the parts may be wrapped in flannel or absorbent cotton, and stimulants and warm drinks may be cautiously administered. If gangrene is present, or if sloughing occurs during reaction, allow the dead portion to detach itself naturally, if it be of small size. Amputation may be required if the gangrenous

part be of large size, and should be done as soon as the line of demarkation appears.

Constitutional Effects of Cold.—The effects of cold are at first stimulating, the pulse being increased in force and frequency. Then a feeling of heaviness and stupor comes on, which gradually changes to an overpowering desire to sleep. This, if yielded to, terminates in coma, and a speedy, painless death. "Cold-stroke," the opposite of "heat-stroke," is a sudden chilling by intense cold in which death is produced by cerebral anæmia; prolonged exposure to a less degree of cold induces death by cerebral congestion, while sudden exposure to warmth produces a fatal result from embolism; partial freezing causes capillary embolism which is usually followed by fatal congestion or sometimes anæmia (Keen and White).

TREATMENT.—If the person exposed to cold be apparently dead, he must be placed in a cold room the temperature of which must be very slowly raised. Frictions with snow or cloths wet with ice-water must be made, and artificial respiration begun. These means must be continued for several hours even if no sign of animation appear. Recovery after several hours of suspended animation is on record.

Keratosi Senilis.—This affection is a cornification of the skin of old people, general or partial, circumscribed or diffuse, and often limited to definite regions, most commonly the face and the dorsal surfaces of the hands and feet, and sometimes the forearm and chest. The lesions consist of light- or dark- yellowish brownish points, dry scaling and horny, or scaling and greasy, aggregated in masses of an irregular circular or oval outline. The surface of these masses is insensitive, and may project about an

eighth of an inch above the surface. These masses may be readily picked off, leaving a small, superficial, smooth, excoriated surface or one covered with minute conical elevations (enlarged sebaceous glands). This affection rarely appears before the fiftieth year, and may not claim attention until fifteen or twenty years later.

PATHOLOGY.—On microscopical examination we find that their bases and the surrounding tissues are in a condition of senile atrophy, with pigment-cells deposited about the vessels; the sebaceous glands are hypertrophied and the lumen of their ducts diminished. The cutaneous papillæ are normal, the bulk of the masses being pigmented epithelial cells (Keen and White).

PROGNOSIS.—The prognosis is favorable if the proper treatment is promptly applied. When left alone the pigmented masses are prone to epitheliomatous degeneration, and may become foci for carcinoma of the face, in which case the dry scales are displaced by a scab, the tissues become hard, and growth is more rapid.

TREATMENT.—In the early stage,unctions with vaselin or olive-oil and the subsequent use of soap and warm water will remove the trouble. When the masses are firmer, ointments should be applied at night, and soft soap or *sapo viridis* in the morning, removing the soap by careful washing with clean, warm water; applications of diachylon ointment will heal any excoriations that may have been produced. When marked projection of the mass is present, the thorough use of the curette, or nitric acid on a pointed stick well worked into the parts, will remove the affected tissues. If epitheliomatous change is suspected, prompt excision is indicated.

Clavus (Corn).—Clavus is an hyper-

plasia of the corneous or horny layer of the epidermis, in which there is an ingrowth as well as an outgrowth of horny substance, forming circumscribed epidermal thickenings, chiefly about the toes. Corns may be hard or soft, the latter being situated between the toes, where they become softened by maceration. Both forms are caused by intermittent pressure and friction. Pressure produces pain by driving the conical mass of hardened epithelium down upon the sensitive corium; constant irritation may produce inflammation and suppuration.

TREATMENT.—The use of well-fitting, comfortable shoes made on properly-shaped lasts is the first indication. Temporary relief from hard corns may be obtained by the use of felt rings which are applied over the corns, allowing the latter to project through the opening, so that pressure is removed from the corn and distributed around it upon the healthy tissue. Prolonged soaking in a warm solution of washing-soda will soften the corn, when it may be removed by gentle scraping with a sharp knife; the tender surface left may be protected by covering it with a plaster of salicylic acid or of salicylic acid with *cannabis Indica*. Another method is that of hardening the surface of the corn by applications of the tincture of iodine or nitrate of silver at night, removing the hardened tissue on the following morning. A third method is the use of the salicylic-collodion mixture: Salicylic acid, 30 grains; tincture of iodine, 10 minims; extract of *cannabis Indica*, 10 grains; collodion, 4 drachms; this to be painted on the corn night and morning for several days and then removed with the corn, by soaking in hot water. Soft corns are best treated by gentle scraping to remove the softened epithelium, the surface being then protected by a pad

of natural wool (as it is clipped from the sheep), or of absorbent cotton, having previously dusted the surface with a powder composed of equal parts of oxide of zinc and boric acid. When corns become inflamed, rest and warm, moist, antiseptic dressings meet the indications. If pus has formed, it must be afforded an exit. Corns should never be cut too closely, as erysipelas and gangrene may follow, especially in the aged.

Verrucæ.—Verrucæ (condylomata; warts) are circumscribed papillary excrescences on the skin, variable in color, smooth at the summit, or studded with moniliform elevations or with clusters of minute, pointed, horny filaments. They may be single or multiple, hard or soft, rounded, flattened, or acuminate. They may rapidly attain their full size, may last indefinitely (*v. perstans*), or spontaneously disappear, at any stage, and are not contagious. If picked or wounded, warts bleed freely, being often very vascular.

ETIOLOGY.—The etiology of warts is obscure.

PATHOLOGY.—Warts consist of an hyperplasia of the papillæ, of the blood-vessels, and of both the rete mucosum and the corneous layer of the epidermis. The common wart (*v. vulgaris*) commonly found upon the hands of children, but occurring on other parts and at any age, form flattened or semiglobular excrescences varying in size from a pin's head to a half-inch or more in diameter. At first they are of the same color as the adjacent skin, later they become darker and harder, and the elongated papillæ, covered at first with cornified epithelial scales, may become partially denuded and appear like a number of projecting-points walled in by a rim of thickened cuticle (seed-wart). Excessive prolongation of the papillæ with-

out the surrounding rim forms the filiform, or thread-like, wart (*v. filiformis*), which is found in narrow lines along the free edges of the nails (*v. subunguinalis*), on the face, neck, eyelids, ears, and trunk, and may be single or multiple. The flat wart (*v. plana*) is a flattish wart with a slight elevation and broad and relatively smooth surface, retaining its outer layer of epidermis, and is met with chiefly in old people. *V. digitata* is a flat wart characterized by digitations springing from its centre or border. *V. acuminata* (fig-wart; moist wart; condyloma; cauliflower excrescence; venereal wart) is a warty growth occurring in parts especially subjected to maceration with sweat, venereal secretions, and mucous discharges, such as the genitals and anal regions of both sexes. They are flat, acuminate, whitish, reddish, pinkish, or flesh-colored, sessile or pedunculated masses of vegetations, commonly smeared with a thin, excessively offensive secretion. They are highly vascular, and may be single and small or as large as an orange, or they may be multiple. *V. congenita* is a wart appearing at or shortly after birth. *V. follicularis* is a wart-like accumulation around the mouth of the sebaceous follicles; it is composed of desiccated epithelium and sebaceous matter. *V. glabra* is a smooth wart. *Nævus verrucosus* is a form which is congenital, or may appear later, and is apt to be pigmented and become hairy; when these pigmented hairy growths cover a considerable area and lie over important cutaneous nerves, they often cause great disfigurement, and are called *papilloma neuroticum*. *V. necrogenica* (post-mortem wart; anatomical tubercle; warty tubercle; tuberculosis verrucosa cutis) is a warty excrescence found usually on the fingers of those who frequently handle the tissues of tuberculous

subjects; it begins as a vesicular or pustular lesion rising from an engorged (congested) base, and may be purely local or give rise to general infection. *V. sebaceæ* is the form met with in persons of seborrhœic tendency and uncleanly habits. *V. senilis* (keratosis pigmentosa; keratosis senilis) is the flattened, pigmented wart of old people (see KERATOSIS SENILIS). *V. syphilitica* is a syphilitic condyloma. *V. veneræ* is a tubercular syphiloderm arranged in clusters.

TREATMENT.—The milder applications consist of the juice of the milkweed (*Asclepias cornuti seu Syriaca*), the tincture of iodine, the solution of the perchloride of iron, moistened powder of chloride of ammonium; stronger applications are sublimate collodion (30 grains to the fluidrachm), glacial acetic acid, and fuming nitric (nitroso-nitric) acid. Excision, or curettage if the warts be soft, is the quickest method of removal; the hypodermic injection of cocaine will lessen or prevent the pain, and the application of fuming nitric acid to the stump or base will restrain the hæmorrhage and prevent return.

Venereal warts may be washed well with bichloride or other antiseptic solution, and then dusted with iodoform, calomel, aristol, or euophen.

Cicatricial Tumors.—Under the name of cicatricial tumors we will mention two important conditions known as "Hypertrophied Scars" and "Keloid."

HYPERTROPHIED SCARS.—When a wound is completely healed, a cicatrix or scar occupies its place. Normally, two things are observed in a scar: its contraction and the gradual perfecting of its tissues. The principal changes by which the latter is accomplished are the removal of all the rudimental textures: the formation of elastic tissue; the im-

provement of fibrous or fibrocellular tissue of the new cuticle till they are almost, but not exactly, like those of natural formation; and the gradual loosening of the scar, so that it may move easily upon the subjacent tissues. The scar also becomes paler and more shining than the surrounding unaffected skin, for the numerous vessels, which the granulating surface possessed, gradually disappear, and are, for the most part, converted into fibrous cords. In some cases, especially after burns, the evolution of the scar does not follow this typical course, but, on account of the prolonged period of cicatrization consequent upon extensive loss of substance, an hypertrophy of a non-malignant character attacks the scar-tissue, sometimes resulting in the formation of masses of dense fibrous tissue varying in size and shape. These hypertrophied scars, on the completion of cicatrization or shortly afterward (from progressive contraction), may occur as nodular or warty excrescences, stellate, or in the form of bridges or reticular bands. This hypertrophic process also occurs, late after cicatrization, in apparently normal smooth scars, giving rise to tumors of various shapes; the etiology in these cases is unknown, especially when the hypertrophy follows a linear incision. In these hypertrophied scars the papillary layer of the skin is wholly lacking, and the component bundles of fibrous tissue are disarranged. The blood-supply, at first abundant, lessens *pari passu* with the contraction of the scar-tissues.

Treatment.—The indications in this condition are best met by excising the hypertrophied scar and covering in the vacant space by a plastic operation. The resulting scar being greater than the original one, this method of treatment is not one of general application, and, more-

over, the new cicatrix may also become the seat of hypertrophy.

KELOID.—Keloid (cheloid; kelis; Alibert's keloid; spurious keloid) is a new growth of connective-tissue formation having its seat or origin in scar-tissue and resulting in the formation of single or multiple tumors.

Symptoms.—It first appears as a pale-red nodule which slowly increases in size, assuming a more or less oval form, with irregular, well-defined, radiating projections. From its resemblance to a crab it derives its name. It may more rarely assume a linear form. The new growth is smooth, firm, elastic, pinkish, elevated, generally devoid of hair, usually painless, but sometimes tender when touched or subjected to pressure; and is occasionally the seat of the most intolerable itching, which no external application seems to relieve. The favorite location of this growth is over the sternum, but it may be situated on the mammae, the neck, arms, and ears. In rare instances the growth may become inflamed and assume for awhile the appearance of malignancy, which appearance disappears usually with the spontaneous decline of the inflammatory action. The development of the growth may be slow or rapid, until a stationary period is reached, which varies in duration. Spontaneous disappearance of the growth not infrequently occurs. In some cases the growth becomes painful, in others a pigmentary deposit is noticed. This condition was first described by Alibert, and is known as spurious keloid to distinguish it from true keloid, which does not attack scars (Erichsen).

Diagnosis.—Alibert's keloid is differentiated from a simple cicatrix by its difference in consistence, outline, color, and elevation, and by its increase in size.

Its points of difference from hypertrophied scars have been mentioned.

Etiology.—These new growths have their origin at the seat of some injury (sometimes very slight) to the skin, as the cicatrices of burns, floggings, cuts, or in the lobes of the ears when they have been pierced for the accommodation of earrings. They are most frequent in middle life and in the colored race.

Pathology.—The growth consists of dense fibrous tissue, which involves the corium and extends in the direction of the connective tissue about the blood-vessels.

Prognosis.—The prognosis is not generally very favorable, although the growths may sometimes disappear spontaneously. The stationary period may extend over years or during life. Occasionally, after a stationary period of variable duration, an increase in size takes place.

Treatment.—The treatment of these new growths is not very satisfactory. The application of anodyne liniments or hypodermic injections of morphine will generally relieve pain when present. The administration of large doses of liquor potassæ will often relieve the pruritus. Removal by knife or caustics should not be attempted while the growth is increasing. Fused caustic potash is recommended as best, if any caustic is used. Multiple electrolytic puncture and repeated scarification, making numerous parallel linear cuts crossed at various angles by other parallel linear cuts, have been suggested with the idea of replacing the diseased scar by a healthy one.

Literature of '97-'98-'99.

The hypodermic administration of thio-sinamin produces an immediate disintegration and elimination of white blood-cells. This is followed by leucocytosis,

persisting for forty-eight hours. It is in this pathological power that the explanation of its value in keloid is found, acting, as it does, in increasing cellular activity in the fixed connective-tissue cells throughout the body. An hypodermic solution made by dissolving 10 parts of thiosinamin in 100 parts of a sterilized mixture of water and glycerin are indicated as a full dose into the glutei or triceps muscles every three days. Sinclair Tousey (N. Y. Med. Jour., Nov. 6, '97).

Malignant Degeneration of Scars.—

The cicatrix of a burn or other extensive scar may undergo malignant degeneration many years after its formation. Erichsen removed a large canceroid growth from the cicatrix of a burn, on the forearm of a woman, seventy years after the receipt of the injury, which happened in childhood.

C. SUMNER WITHERSTINE,
Philadelphia.

SYPHILIS.

Etiology and Symptoms.—Syphilis is due to the inoculation of a healthy individual with the secretion of a syphilitic subject or syphilitic blood. The disease is most usually transmitted during sexual congress, but is quite frequently contracted in other ways. The conditions for inoculation are such that the disease may be transmitted extragenitally with great facility. It occurs through contact of the infectious principle of syphilis with a surface in a healthy individual from which the epidermis has been removed. The removal of the epidermis is essential, because the syphilitic infection has no corrosive properties *per se*.

Clinical experiences that apparently disprove this assertion are explicable by certain additional factors attendant upon the exposure to syphilitic infection; thus if the syphilitic infection be associated with another type of infection which pos-

sesses specially corrosive properties, the epithelium may be destroyed by the latter, this facilitating the absorption of the former. Uncleanliness favors the maceration and removal of epithelium, and if, under these conditions, a syphilitic secretion be brought into contact with the part, the epithelium may be removed by causes entirely independent of the syphilitic infection, after which the latter takes effect. When the syphilitic infection is associated with chancreoid—the most corrosive of the venereal infections—the absorption of the syphilitic virus is greatly facilitated. Whether there is any antagonism between the chancreoid infection and that of syphilis sufficient to offset the favoring action of the corrosive property of chancreoid in the absorption of syphilis is open to question.

It is obvious that indiscriminate sexual congress is the most potent predisposing cause of syphilitic infection. Uncleanly habits and local circumstances favoring the retention of secretions, physiological or pathological, are important predisposing causes. When the local circumstances favor a development of extreme sensitiveness and a tendency to abrasion of the epithelium under slight causes, the predisposition to infection is greatly enhanced. Extreme length of prepuce in the male and the labia in the female are important predisposing causes. Alcoholism is an important predisposing cause, for two reasons: first, because it tends to produce irritability of the mucous membranes of the sexual organs; secondly, because of its tendency to produce moral obliquity and indifference as to results on the part of those who indulge to excess. In many instances individuals while under the influence of alcohol contract syphilis from sexual exposure which would be abhorrent to the patient when in his or her normal condition.

The immediate cause of syphilis is infection by a peculiar morbid principle contained in syphilitic blood or the secretion of the syphilitic lesion. This principle, although it has never been positively demonstrated, is now quite generally believed to be a germ.

Incubation Period of Syphilis.—After the poison of syphilis has been absorbed a certain period elapses before its morbid effects become manifest. This period lasts, upon the average, about twenty-one days, but varies considerably from this in different cases. Fournier relates a case in which the period was seventy-five days; Guérin, one of seventy-five days; and the writer has noted a case of seventy days. Instead of being prolonged, the period may be shorter than usual; thus, Hammond relates one of three days, and Dr. Nott, of New York, since deceased, reported his own case as developing within twenty-four hours after wounding his finger in operating upon a syphilitic subject. Taylor reports a case in which the initial lesion appeared upon the second day, induration upon the fourth day, and general symptoms during the sixth week. It may, however, be accepted, as a practical rule, that true chancre does not appear before the tenth day. Any sore appearing prior to that time is probably chancroid or some simple affection, while any appearing later is quite likely to prove true chancre.

Bacillus of Syphilis.—The first investigator whose labors received any particular attention was Lustgarten, who claimed to have discovered in microscopical sections of chancre and syphiloma bacilli characterized by their color, reaction, form, and relative position. These bacilli he described as slim, straight, or somewhat curved little rods, closely resembling tubercle bacilli. He claimed that by his method of coloring

he could differentiate the bacilli of syphilis from those of lepra and tuberculosis especially, and from all other known pathogenic bacteria. The bacillus of Lustgarten, according to its discoverer, acts by incorporating itself with the white blood-corpuscles. Neisser favors the bacillus theory of syphilis. Ehrlich and Birch-Hirschfeld also advocate it. Klebs, Aufrecht, Bergmann, and, following them, Bardozi, assert the existence of a peculiar micrococcus in the lymphatic glands and vessels of syphilitics.

Literature of '97-'98-'99.

Pure culture of micro-organisms personally obtained from syphilitic tissue, and especially from the blood, which, when inoculated into animals, presented a reaction to human syphilis. When these cultures were injected into the veins of pigs, or inserted subcutaneously, there developed at the point of injection a hard inactive sore, and eight or ten days after the injection there appeared on the skin of the animal numerous bright-red spots, which disappeared after about a week. Rabbits developed at the site of injection similar hard sores. Two of these rabbits were paired, and the female gave birth to a litter of seven, all dead, and two of them, being macerated, greatly resembled in this respect syphilitic human embryos. The cultures were obtained especially from the marrow and epiphyseal lines of the bones of children who had died from hereditary syphilis. The material was preserved in bouillon, and then grown in various media. In almost every instance there was found a variety of streptobacilli or streptococci which had been previously obtained from the blood of patients suffering from dementia paralytica and tabes syphilitica. The bacilli can best be obtained from the blood, after the administration of mercury for a short time during the tertiary period. In the secondary period less success was secured in obtaining germs from the blood, which was thought to be due to the fact that at this period they lie chiefly in the

skin. Von Niessen (Centralb. f. innere Med., May 7, '98).

Despite the unsatisfactory results thus far attained in the bacteriology of syphilis, we are, perforce, almost compelled to accept it as of germ origin. The starting-point of the disease is certainly the absorption of a peculiar morbid principle or contagion, the results of which are consistent only with the germ theory. Fessenden Otis, some years since, following Besiadecki and others, expounded the most logical and ingenious theory of syphilitic infection thus far advanced. He claimed that the *contagium* consists of a degraded infectious cell of very minute proportions, which acts by incorporating itself with the normal leucocyte and its derivatives. This view is in nowise inconsistent with the germ theory, and by supposing the incorporation of a specific bacillus with the "syphilitic germinal cell" of Otis, his views are apparently brought up to date. This much may be said regarding the infection of syphilis, namely: however deficient we may be in positive knowledge of the syphilitic micro-organism, we at least have fairly definite views of the manner of its action.

Primary Local Changes from Infection.—Although, for the sake of clearness of clinical description, syphilis may be considered a local disease during the first few weeks of its existence, it is nevertheless true that it is practically constitutional from its inception, because we have thus far no means of preventing its systemic results. But, so far as its clinical and pathological histories are concerned, the disease is exclusively local until after the lapse of some weeks following its inception.

The first effect of the syphilitic infection is a gradually increasing accumulation of leucocytes—*i.e.*, white blood-cells,

or lymph-cells—at the site of inoculation, produced by a modification of the normal leucocytes and connective-tissue elements through the influence of the syphilitic infection. This phenomenon probably begins immediately after the infection takes place. It is, however, gradual in its development; hence a certain period elapses before the changes are apparent.

The previously normal accumulated cells (the syphilized cells of Besiadecki, Otis, *et al.*) contain the germs of the syphilitic infection. They become larger, more granular, and contain numerous nuclei; are infectious, and possess exaggerated powers of proliferation and amoeboid movement. Associated with these characters is a marked tendency to retrograde metamorphosis. When removed to the tissues of a healthy individual, these cells, by virtue of their infectiousness, *i.e.*, by virtue of the syphilitic germ they contain, produce changes in the normal leucocytes in their new environment, exciting rapid proliferation in them, as well as undergoing rapid changes themselves. Whether the infecting principle be a degraded cell of poisonous properties, the infectious nucleus of a degraded cell, a bacillus, or a cell containing a bacillus,—the two latter, one or both, being most likely,—is of no importance in the subsequent history of syphilitic events, nor does the existence or non-existence of a micro-organism militate against the plausibility and practicality of the views of syphilitic pathology originally presented by Besiadecki and Otis. This much is certain, however, that just as the leucocyte is the primordial cell in the normal physiological processes of growth, so is it the basis of all so-called pathological processes, and particularly those of syphilis,

when modified in the manner peculiar to the particular disease.

Taking as our point of departure the initial lesion of syphilis, we note a localized proliferation of the now infected and perverted cells, and, following the infection in its course, thickening of the lymphatic vessels and enlargement of the lymphatic glands. After a time infection-bearing—i.e., microbe-carrying—cells, or perhaps independent micro-organisms, free themselves from the initial accumulation, travel on through the lymphatics, enter the *receptaculum chyli*, and are finally emptied into the circulation by the thoracic duct, to be then driven to the superficies of the body, the central nervous system, and the viscera with the general blood-current.

Literature of '97-'98-'99.

Conclusions in regard to the histopathology of syphilis: 1. Syphilis primarily infects the lymphatic system and spreads by the lymphatics. 2. The infection of the blood-vessels occurs from the perivascular lymph-spaces. The veins are less resistant, and consequently show the most marked changes, while the arteries, certainly in the earlier lesions, are not so prominently affected as the veins. 3. The specific living syphilitic poison is originally and probably permanently located in the lymphatic system, whence it invades the blood-vessels and leads to the appearance of general manifestations. After such a general outbreak there is established, either in consequence or independent of an antiluetic treatment, an hæmatogenous immunity. This latter, however, lasts only a limited period of time, when a new invasion of the blood-vessels from lymphatic foci may take place. Whether a final complete hæmatogenous and histogenous immunity may be established with the proper treatment or without it, is a question for discussion. Maximilian Herzog (Chicago Med. Recorder, Apr., '99).

Various secondary phenomena now occur in the different tissues: General enlargement of the lymphatic glands,—general adenopathy,—as a result of (1) the proliferation of the cells carried to them by the blood, (2) the proliferation of their own lymphoid and connective-tissue elements under the stimulus of the infection brought by the syphilized cells, and (3) an accumulation of infected germinal material collected by the absorbents from the superficies of the body. Engorgement of the fauces and pharynx follows, due to a localized cell-proliferation and accumulation in their rich net-work of lymphatics. Mucous patches are likely to occur, and are simply quasipapules upon moist mucous surfaces, due to a circumscribed collection of the characteristic cells,—constituting syphilitic granuloma in whatever lesion it may be found. The same description will apply to the true papule upon the integumentary surfaces. This papule may have an excessive accumulation of cells and become a tubercle, or, from pressure upon and interference with, the nutrition of the normal tissue-elements by the cells in combination with their own tendency to retrograde metamorphosis,—with or without complicating pus-infection,—a pustule, perhaps, forms that may break and result in ulceration. Nodes or peculiar periosteal swellings occurring in syphilis are collections of proliferating syphilitic cells—granulomata.

The foregoing are the essential points in the pathology of active syphilis, as expounded by Otis, modernized by the addition of the microbial view of the disease. Whether the changes following the initial lesion are due to the transference to the system at large of an infected cell, or to the action of a microbe similarly carried, the pathology of the

disease as above set forth seems to be logical. There are many phenomena in the course of syphilis to which the syphilized cell bears no particular relation. Such phenomena were dwelt upon with especial emphasis by the opponents of the syphilitic pathology involved in the foregoing, when originally formulated by Otis. An acceptance of the microbial origin of the disease, however, at once harmonizes the apparent inconsistencies in the theory appearing from time to time in the natural history of syphilis, and seems to answer the arguments of the opponents of the theory so far as this particular phase of their opposition is concerned. Such phenomena as are inexplicable upon the ground of localized cell-accumulation and tissue-obstruction are at once rationally explained by the action of syphilitic toxins elaborated by the specific micro-organism of the disease. The syphilized cell may reasonably be regarded as a carrier of, or as a collaborator with, the specific bacillus of syphilis in the production of toxins.

The danger of permanent injury to the tissues is proportionate to the amount of accumulated cells and the duration of their contact with the normal tissues, with consequent production of secondary changes. A careful study of syphilitic lesions demonstrates the truth of this proposition, whatever theory of the pathology of the disease is accepted. The proposition advanced by Otis in explanation of the foregoing is hardly open to dispute. "The natural course of the syphilitic cell is to accumulate in and obstruct various tissues, thereby forming neoplastic masses similar in structure to inflammatory neoplasia, and finally to undergo retrograde metamorphosis and elimination, resulting eventually in spontaneous cure of the disease."

As to the tissue-changes at the site of

inoculation, the first manifestation of the disease is a peculiar lesion characterized by induration. This lesion is due to a localized accumulation of cells infiltrated in the meshes of the connective tissue and tunica adventitia of the blood-vessels, forming a circumscribed mass. The cells vary somewhat in character, those in the vascular walls being either round, spindle-shaped, or branched; but the bulk of the mass consists of the characteristic round, multinuclear, granular cell. It is obvious that the mass is composed of histological elements derived from transformation of the leucocyte or its derivatives. The changes are similar to those of simple dermatitis, save in the absence of exudate, the induration being dry and hard. The absence of fluid is probably dependent on thickening of the walls and contraction of the lumen of the blood-vessels, which render it difficult for serum to exude from them. This would also explain the relative anæmia and diminished nutrition of the neoplasm. There is also to be taken into consideration a quality of the syphilitic infection too infrequently considered: *i.e.*, the fact that it has absolutely no irritating properties *per se*.

The peculiar affinity of the syphilitic process for the lymphatic tissues in general is evidenced throughout the entire course of syphilis. There is a very intimate relation between the small blood-vessels throughout the body and the beginnings of the lymphatic system. The small blood-vessels are surrounded by perivascular lymph-spaces. It has been claimed that the tunica adventitia of the smaller vessels is really a part of the lymphatic system. This arrangement is to be taken into contemplation in considering the well-known facility with which infections of various kinds are taken up by the constant current

existing between the blood-vessels and lymphatics via the tissues and conveyed to the general circulation. It also explains general lymphatic involvement in infections that primarily enter the general circulation.

Literature of '97-'98-'99.

Regarding mesarteritis syphilitica, the following conclusions are reached: 1. In the aorta there may be an inflammatory affection of the tunica media, characterized by a circumscribed small-cell infiltration. This infiltration afterward undergoes transformation into a kind of connective tissue poor in nuclei. Accompanying the transformation there is always a certain amount of shrinking. Here and there may be found some necrosis of the media. 2. The tunica intima may be secondarily involved, and may show thickening or may be affected through the scar-like contraction going on in parts of the media. 3. The tunica adventitia may show small-celled infiltration, but more often there is a diffuse fibrous increase without tendency to contraction. 4. The affection has only been observed in syphilitic subjects, and is regarded as an hitherto unrecorded result of syphilis. 5. The affection is very likely the cause of aortic aneurisms in syphilitic subjects. 6. The affection is totally different from chronic endarteritis, though the two may be associated with each other. F. Backhaus (Beit. zur path. Anat., B. 22, H. 3, '98).

The evolution of the other elements of the local manifestations of syphilis—*i.e.*, primary lymphoplasia and adenopathy—is practically a duplication of the changes occurring in the initial lesion. Within a few days after the latter appears the lymphatic vessels leading from the infected surface enlarge and harden, often resembling pieces of pencil or wire beneath the skin or mucous membrane. The degree to which inflammation enters into the process depends upon the amount of irritation of the primary le-

sion and the presence or absence of mixed infection. Typically, the lymphatic lesion is an hyperplasia rather than a lymphitis. It would appear that the local influence of the infection travels with slowness and deliberation. After a time the lymphatic glands into which the lymph-current from the infected area flows react to the infection and primary adenopathy occurs. No general involvement of the lymphatic glands occurs for some weeks, apparently not until the infection has had time to reach the general lymphatic system via the tissue-lymphatics, the central lymphatic circulation, and the general blood-circulation. If the infection is not local in its influence primarily, this is a singular phenomenon, for there is no reason why there should not be almost simultaneous involvement of all the lymphatics of the body, granting that the infection is general from the start. Each involved gland would appear to be a depot for the storing up, production, and finally the distribution of the infection. Each lymphatic gland is affected by a tissue-hyperplasia precisely similar to that existing in the initial lesion. It becomes hard and woody to the touch, its circumscription and induration being explicable upon the same ground as the same qualities of the initial lesion.

The changes at the site of infection and in the lymphatic glands and vessels first involved have been most appropriately termed the initiatory period of syphilis.

The Initial Lesion, or Chancre.—The typical initial lesion is an induration pure and simple. The facilities for mixed infection and for irritation of the lesion are so many and various, however, that a simple induration without solution of continuity of skin or mucous membrane is exceptional. Chancre, as the initial

lesion is most frequently termed, presents itself in the following forms: 1. A superficial loss of epithelium forming a non-suppurating open lesion. This is termed simple erosion. 2. A greater or less area of ulceration, saucer-shaped, due to irritation and syphilitic pus-infection. 3. A deep ulcerative excavation with sloping edges. 4. Herpetiform and crustaceous chancre. 5. Diphtheroid or so-called diphtheritic chancre. 6. An indurated, non-secreting *plaque*, papule, or tubercle. It will be understood that the open varieties of chancre present in typical instances an underlying more or less characteristic induration. (*See colored plate.*)

Erosion may be said to include about two-thirds of chancres, and is usually situated upon the mucous membrane, very often inside the prepuce in the male. In shape it is oval, or perhaps a trifle irregular, with a raw, polished surface of a wine-red color and sometimes a pultaceous base, but usually secreting a simple thin, sanious fluid, devoid of pus, or at least containing a very small amount of pus-corpuscles. These erosions are flat, and may surmount a thin parchment induration, or may cap a hard tubercle as large as a marble. Superficial ulceration with sloping edges—the ulcer presenting a saucer-shape—is found with the parchment, but most often with the split-pea, induration. When this ulceration caps a large mass of induration, it is likely to be quite deep and funnel-shaped from extensive necrobiosis, constituting the so-called “Hunterian chancre.” The secretion from a chancrous ulceration is quite likely to be of a sero-purulent character. Herpetiform and crustaceous chancres may occur in any situation. The simple indurated papule or tubercle is usually found upon the skin, the integument of the penis, or

even upon the prepuce itself when it is short and dry. Ulceration of this form of induration might occur if it were kept moist, the conditions of warmth, moisture, and irritation combined being especially favorable to the production of ulceration. The parts upon which it develops are perhaps not so rich in lymphatic spaces as those in which a chancre is more likely to ulcerate, the collection of cells being consequently smaller and the tendency to necrobiosis less marked.

Several unusual types of chancre have been described. French authors describe a variety called the “herpetiform.” This seems to be simply a lesion of herpes that becomes infected with syphilis and eventually indurates. In some cases the rationale of its formation is exceedingly simple. At the time of exposure to syphilis the subsequently infected surface comes in contact with some local irritant. The patient being predisposed to herpes, one or more vesicles develop within a short time after exposure. The chancrous induration develops in the herpetic lesion later on, at the end of the period of incubation. Fournier describes a form of chancre that he terms “crustaceous.” This, he claims, may be confounded with scabies, which latter disease may present pseudo-induration and inguinal adenopathy. This condition yields to sulphur, which chancre does not. Fournier claims, however, that expectancy is the only recourse in the differential diagnosis of crustaceous chancre.

The symptoms of urethral chancre, when too deep to be seen without the urethroscope, consists in a discharge coming on after the usual period of incubation, this discharge being thin, and perhaps sanious, but sometimes creamy and thick. There is a painful spot in the urethra that is especially noticeable during micturition and erection, with pos-

sibly a lump in the course of the canal, plainly perceptible on palpation with the thumb and finger in some cases. The character of the discharge depends upon the degree and character of the complicating urethritis. The characteristic symptoms of stricture may be present, produced by the pressure of the chancre upon the urethral lumen. By means of the urethroscope an ulcer may often be detected, and in a short time the general enlargement of the glands and other symptoms clear up the diagnosis. Great caution is necessary in making a diagnosis until these confirmatory symptoms appear. The writer desires to call attention to a peculiar form of urethral chancre that may lead to grave errors in diagnosis. This appears as a slight erosion of a milky color, just within the meatus. Induration is not perceptible and the lesion looks not unlike an intra-urethral herpetic lesion.

VARIETIES OF INDURATION.—The initial induration—initial sclerosis—may present itself under several different forms:—

1. The simplest form, the parchment induration, usually underlies ulceration, and may escape notice unless carefully sought by pinching up the lesion with the thumb and finger so as to press lightly upon its edges without bending it. This is the commonest form, according to some authorities, and is certainly so in hospital practice. In private practice, however, examples of the Hunterian chancre, or other marked forms, are more frequent in the writer's experience.

2. There is a variety of the parchment induration sometimes seen that is especially apt to escape attention, so insignificant does it seem. It consists in a very superficial cell-infiltration, presenting a very slight induration when lightly pressed upon. In appearance it is a

slightly-brownish patch covered by very fine scales, not unlike a minute patch of psoriasis. This superficial induration is called by Otis the "dry, scaling patch." The author would suggest as a better term "squamous induration."

3. The induration may be somewhat like a split pea beneath the skin, its convex surface being capped by ulceration. This induration is plainly marked and freely movable, with a feeling like wood or bone, or perhaps more nearly like cartilage.

4. The induration may be large and extend beyond the bounds of the ulceration, often attaining the dimensions of a chestnut or almond. There may or may not be ulceration. When an induration of this description is ulcerated, its convexity is sometimes capped with a funnel-shaped ulcer,—the whole so-called Hunterian chancre. In many cases there is merely a hard, purplish lump, with no ulceration, or, at most, a very superficial erosion capping the induration. In many cases the induration is irregular, sometimes presenting several distinct tumors, or united by areas of less marked induration, giving, in the case of the penis, a "choked" appearance to the organ.

5. A very superficial infiltration may underlie a pseudomembrane of greater or less dimensions: "diphtheritic chancre."

LOSS OF TISSUE IN CHANCRE.—The occurrence of ulceration in chancre is quite important, and, aside from the various sources of irritation that may act as exciting causes, is explicable by the histological characters of the lesion. As already noted, the chancre consists of localized cell-accumulation that not only presses upon the capillaries, but actually invades their walls, thus causing a diminution of blood-supply and relative anæmia and malnutrition of the neoplasm and tissues involved by it. This

malnutrition gives rise to molecular disintegration of the superficial layers of the lesion, which break down and, becoming infected, form an ulcerated surface.

The induration of chancre is variable in its extent, according to the tissues in which it is situated, and within certain limits is proportionate to the extent of surface primarily infected: *e.g.*, when an extensive cut or abrasion is inoculated with the syphilitic infection, the resulting chancre is likely to assume the size and conformation of the traumatic lesion.

In quite rare cases of chancre, or apparently simple lesions followed by constitutional syphilis, induration appears to be entirely absent. This is, perhaps, due to the fact that it has been overlooked through carelessness or co-existence with chancroid, or it is so slight that it escapes attention. After a chancre becomes phagedænic, induration shortly disappears.

It is a peculiar, and at the same time unfortunate, fact that typically indurated chancre is a rare thing in women. Venereal sores appear and disappear, and contagion is spread about promiscuously in many instances, while the patient is entirely unconscious of her trouble.

In simple chancre the induration most generally precedes the ulceration, but often follows it, coming on during the first week. The primary occurrence of ulceration is probably due to some irritant acting chemically, or chancroidal or purulent infection occurring simultaneously with the syphilitic infection. This is the invariable course of mixed sores, and it is highly probable that the majority of lesions in which induration follows, instead of precedes, ulceration are primarily either chancroid, herpes, or simple ulceration from pus-microbes.

The induration of chancre may be transitory, and, as already indicated, may

disappear so rapidly as to be overlooked. Cases have been observed in which it lasted only ten or twelve days, but such cases are exceptional, the ordinary duration being from one to three months, in rare cases lasting for some years.

SECRETION OF CHANCRE.—The secretion of syphilitic chancre is very scanty and sero-purulent for reasons already given, and retains these characters throughout unless the sore becomes inflamed, in which case it becomes profuse and purulent, and perhaps bloody. Some chancres exhibit a marked tendency to bleed. A number of cases have occurred in the writer's practice in which this symptom was quite persistent and recurred upon the slightest manipulation of the sore: the so-called "hæmorrhagic chancre."

Many attempts have been made with syphilitic secretions, and especially the secretion of the chancrous ulcer, but autoinoculation has thus far been found impossible, as a rule. When chancre is inflamed and secreting profusely, its secretion—containing toxins and pyogenic microbes—will produce a pustule if autoinoculated, acting like any other irritant. This pustule may be followed by ulceration, but never by hard chancre. When the sore is mixed, autoinoculation is, of course, feasible.

COMPARATIVE FREQUENCY OF CHANCRE AND CHANCROID.—The relative frequency of chancre and chancroid is variously estimated by different observers. Thus, Fournier finds in his private practice that the frequency of chancre as compared with chancroid is about three to one. The statistics of ten years at one of the large Parisian hospitals show that chancroid comprised about 80 per cent. of sores. From clinical experience the writer is inclined to believe that these estimates are fair criteria of the rela-

tive frequency of the two varieties of genital sore as seen in both private and hospital practice. It must be remembered, however, that in hospital practice patients with atypical and possibly mixed sores are often lost sight of after they leave the hospital. Doubtless many of these afterward develop syphilis, thus cutting down the percentage of simple chancroids.

Complications of Chancre.—There are some complications of syphilitic chancre that demand attention: 1. First and simplest we have vegetations or papillomatous growths: the so-called venereal warts. These result from local irritation combined with heat and moisture, and are identical with vegetations occurring under other circumstances. The writer believes that, while simple genital papillomata are in no sense syphilitic, they, like herpes progenitalis, thrive best on syphilitic soil. Proper measures of cleanliness will usually prevent the formation of vegetations. 2. Inflammation of chancre — pus-infection — sometimes occurs, giving rise to considerable pain and profuse purulent secretion. 3. Chancre may be complicated by chancroid, constituting “mixed sore,” unless the two forms of disease appear in different locations. 4. Chancre may be attacked by phagedæna or gangrene.

MIXED CHANCER. — When a chancre becomes inoculated with chancroid, its ulceration deepens and it gradually assumes the general characters of chancroid; but, unless phagedæna occurs, induration usually still persists. Oftener than is usually supposed, however, the chancroidal process inhibits the development of chancreous induration, or initial sclerosis; as a consequence, syphilis often-times follows an apparently typical soft sore. Slight sclerosis is very apt to be melted away, so to speak, by the chan-

croidal infection, and thus escape attention. When chancroid develops primarily—from typical mixed infection—it generally runs its usual course until the incubation period of syphilis has elapsed, when induration occurs. The secretion of the mixed sore is autoinoculable, and capable of transmitting either disease alone, or both together, to a healthy person. In some cases chancroid appears and rapidly heals, or the incubation period of syphilis is long, and induration develops in the cicatrix of the chancroid after it has soundly healed.

The test for mixed chancre is autoinoculation. Any indurated sore, the secretion of which is autoinoculable in the true sense of the word, and which is followed by constitutional syphilis, is a mixed chancre. By the term autoinoculable is meant a sore the secretion of which, inoculated in a new situation in the diseased individual, will produce typical chancroid.

The methods of contraction of mixed chancre are two, viz.: (1) both poisons may be contracted simultaneously, or (2) either variety of genital lesion may develop primarily and subsequently become inoculated with the other form of disease.

Typical syphilitic chancre—initial sclerosis—may undergo marked transformations: *e.g.*, a chancreous induration, particularly when situated in a moist locality, such as a mucous or quasimucous surface, may lose its hardness and at the same time become transformed into a quasimucous patch by becoming covered with a characteristic whitish pellicle. In some instances the sore acquires the form of the mucous patch, yet retains its characteristic induration. Morrow has described a “diphtheritic” variety of chancre. It is possible that this may sometimes be the mucous transformation just

described, and not a special variety of lesion, but the author has met with cases corresponding exactly with Morrow's description.

PHAGEDÆNIC CHANCRE.—Phagedæna may attack true chancre, and when it does so is quite likely to be of the gangrenous form. The pultaceous and serpiginous varieties are quite rarely seen under such circumstances. After phagedæna has once invaded a chancre, induration is no longer perceptible. If the sore be of the mixed variety, the pultaceous or serpiginous form of phagedæna is then quite likely to develop. Such authorities, as Bassereau and Diday, think that the type of syphilis following phagedænic chancre is apt to be exceptionally severe. This is true in my experience, but is explicable by the fact that phagedæna, *per se*, is probably due either to general debility or a peculiar diathesis that lessens both local and systemic resistance to disease and especially to syphilis, rather than by an extraordinary intensity of the syphilitic infection. The question of a special germ infection in phagedæna is still *sub judice*.

Infectious Secretions in Syphilis and Infection.—Inoculations with the secretions of chancre, mucous patches,—in short, all secondary cutaneous or mucous lesions capable of yielding a discharge,—and of syphilitic blood have been made with entire success. Whether the blood is infectious between the periods of active manifestation of the disease has not been determined by experiment, but from accidental observations made upon vaccinal syphilis it probably is. There is no logical reason why the blood should not be infectious at such times, for each successive crop of lesions is not due to a new development of syphilitic infection, but to its renewed activity. The secretions of non-syphilitic lesions occurring

upon a syphilitic are not inoculable unless mixed with the blood of the syphilitic subject: *e.g.*, the secretions of gonorrhœa and chancreoid occurring in a syphilitic produce in another individual only gonorrhœa and chancreoid unless they contain syphilitic blood. Diday inoculated pus from acne pustules produced by potassium iodide on a syphilitic subject, but with negative results. It is also probably true that a vaccine-lymph derived from a syphilitic is not capable of producing syphilis unless it contains some of the patient's blood. This, however, should make the physician none the less cautious, for it is very easy for a small quantity of blood to become mixed with the lymph and remain undetected. The vaccine-scab from a syphilitic patient is always dangerous, as it invariably contains a certain proportion of dried blood in its composition.

Inoculations with the secretions of tertiary lesions and with blood during the tertiary stages of syphilis are negative, although there have been apparent exceptions to the rule.

The non-transmissibility of syphilis during its tertiary period is perhaps the strongest evidence that the lesions of this stage are not syphilitic at all, but simply sequelæ. None of the physiological secretions, such as mucus, sweat, urine, milk, and semen, are inoculable, unless they contain either syphilitic blood or the secretion of a syphilitic lesion. The saliva, so often the medium of contagion, is innocuous unless mucous patches or other lesions exist in the mouth, in which case it is contagious in the highest degree. The syphilitic infection—be it cell or bacillus—must be present, else no secretion, physiological or pathological, can transmit syphilis.

In every method of transmission of syphilis, save two, the general disease is

always preceded by chancre, and the existence of the latter may be inferred whether it has been detected or not. Chancre is never present in the case of (1) infection of the child *in utero* and (2) the infection of the mother through the medium of the child, the latter mode of transmission being still a subject of controversy.

Literature of '97-'98-'99.

In 4142 cases of syphilis occurring in personal practice it was found that in 193 cases of tertiary syphilis the patients denied that they had been or were infected. The causes of ignored syphilis are to be found (*a*) in the fact that women, knowing much less about syphilis than men, are more frequently infected without knowing it. (*b*) The frequency of extragenital chancres. Of 100 chancres, from 8 to 10 are extragenital. (*c*) Infantile, wet-nurse, and professional contaminations are often erroneously interpreted. Midwives and physicians are often infected, and do not know it. (*d*) Many cases of syphilis remain ignored, owing to the manifestations having escaped notice or having been falsely interpreted. Mucous patches about the anus have been mistaken for hæmorrhoids, syphilides of the mouth and throat for simple anginas, syphilitic cephalalgia for migraine, and osteocopic pains for rheumatism. Often the woman is infected by her husband. On the first appearance of symptoms the husband rushes to the family physician and begs of him to reveal nothing. The wife, disbelieving that she has syphilis, refuses to take treatment for it. To obscure lesions, even if the patient denies syphilitic infection, syphilis may be the cause at work. Proceeding on this hypothesis, in a large number of cases, excellent results have been obtained. Fournier (*Jour. de Méd. et Chir.*; *Jour. Cut. and Genito-Urin. Dis.*, Aug., '99).

Modes of Contagion.—The methods of contagion in syphilis are classified as mediate and immediate. By the mediate method we understand the transmission

of the disease through the medium of infected drinking-utensils, tobacco-pipes, towels, etc. Chancroid is very rarely transmitted in this way, but syphilis is often so transmitted on account of the multiplicity of its lesions, that are sometimes apparently so insignificant, but none the less infectious. By the immediate method of contagion is implied the direct contact of an abraded surface in a healthy person with a secreting lesion or infected surface, or with syphilitic blood from a non-syphilitic lesion, in a syphilitic subject. The type of this mode of contagion is, of course, infection during sexual intercourse, but the disease may be immediately inoculated in many other ways; quite often it is contracted by the physician or surgeon in operating upon or examining syphilitic subjects.

Chancre is sometimes contracted in kissing, a small, insignificant-looking—perhaps unrecognized—mucous patch upon the cheek, lips, or tongue of the diseased person inoculating any slight fissure or abrasion that happens to be present about the mouth of the healthy subject.

The duration of syphilitic chancre is variable. It may last for a couple of weeks, but in the majority of cases an eruption appears prior to the disappearance of the chancre. It may last for some months, especially if complicated. Cases arise in which the induration lasts for years.

Chancre is generally single, but may be multiple, according to the number of points primarily inoculated. It is usually situated upon the genitals, behind the corona glandis in the male especially; but its situation varies greatly, as may be readily understood upon considering its numerous methods of contagion. Chancres of the face, tongue, nipple, and fingers are not so very rare, and instances

of chancre of the tonsil have been reported. Urethral chancre is not uncommonly seen.

Literature of '97-'98-'99.

Next to the lips and fingers, the eye is the most common site for an extragenital lesion, as the habits and social conditions of one country differ from those of another, and those of large cities from those of the country-districts, great variation is to be expected in the statistics on the subject. The unusual frequency of primary chancre of the lid among the Russian peasantry is explained by the custom of licking the inflamed eye, or bathing it with urine. The most common site is on the lower lid; occasionally the upper lid is involved and more rarely the conjunctiva. The contagion is transmitted indirectly by sponges, handkerchiefs, and towels, and directly by kissing, licking, and the like. Leon Gruder (*Wiener Klin. Woch.*, Oct. 13, '98).

General Infection, or So-called Secondary Syphilis.

The initiatory period of syphilis terminates when the infection has traversed the lymphatics leading from the chancreous surface, entered the receptaculum chyli, and from thence passed into the blood, through the medium of which it is disseminated throughout the system, giving rise to the peculiar changes characteristic of syphilis in every tissue and organ, the changes being more marked in some parts perhaps than in others in different cases, though there is no tissue that enjoys complete immunity from the ravages of the disease.

Following the initiatory period, with its initial sclerosis and primary adenopathy, there is an apparent period of incubation lasting, on an average, forty to forty-five days, and followed by general symptoms. During this so-called second stage of incubation the syphilitic infection is slowly traversing the lymphatics

and gradually making its way into the general blood-current.

GENERAL ADENOPATHY.—The syphilitic infection eventually arrives at the receptaculum chyli, from which it is carried to the general circulation, and after entering the right heart is finally disseminated throughout the tissues generally, producing its characteristic effect of cell-proliferation, the first evidence of which usually consists in a general glandular enlargement. This, however, may appear simultaneously with or follow the discovery of the roseola. On section, the enlarged glands are found to be, histologically and macroscopically, reproductions of the adenopathies of the initiatory period.

THE ROSEOLA.—At the end of about forty to forty-five days, on the average, after the development of the initial sclerosis, the period of "general, systemic infection and localized cell-accumulation" begins, the infection having now reached its final destination. The first evidence of general infection in order of discovery usually consists in the development of a peculiar eruption of rose-colored spots: the syphilitic roseola. Although this eruption may escape observation, it is probably constant, being always present in a greater or less degree, in some cases lasting for a number of weeks, probably from two to eight, while in others it may last only a few hours. In its general appearance the eruption is not very unlike measles. The spots are of a dull, rose-red hue, and disappear on pressure when recent, but later on leaving a coppery stain.

The syphilitic roseola is due to dilation of the cutaneous capillaries, with subsequent stasis, and the exudation of leucocytes and red blood-corpuscles into the implicated integumentary area. It is possible that the dilation and stasis are

reflex phenomena due to reflected local irritation produced by the syphilitic infection, or to the direct influence of the infection upon the vascular walls; but this explanation is hardly so rational as that involving a direct influence upon the sympathetic centres analogous to that produced by quinine, belladonna, and various other drugs and by emotional disturbances. The disturbing element in the action of syphilis on the sympathetic is probably a toxin or toxins elaborated by the syphilitic micro-organism.

SYPHILITIC PRODROMES.—The roseola may be preceded or accompanied by various phenomena of a general character. Among these phenomena are malaise, headache, backache, rheumatoid pains, anorexia, nausea, prostration, sleeplessness, and nervous irritability, and in some cases quite sharp febrile movement, perhaps followed by perspiration. These are the symptoms several or all of which have been included under the head of syphilitic fever, or, as Diday more correctly terms them, "syphilitic prodromes." It has been claimed that, on reviewing the list of single symptoms that may occur, it is evident that they may be dependent upon so many and various coincident disturbances that there can be no great constancy or certainty about their occurrence in syphilis, and that the term syphilitic fever is therefore obviously inaccurate. This observation, however, may be fallacious because of faulty methods of study. The various symptoms are toxæmic, and, although they vary in severity, might be found to exist in greater or less degree in all cases by very careful investigation. The temperature, be it remarked, is rarely studied.

Literature of '97-'98-'99.

Some of the results of secondary syphilis, which are important owing to the fact that they are difficult to diag-

nose in the absence of distinct history, and from the fact that they are much more frequent in women than in men, pointed out. The first is headache, which may be divided into three degrees. In the first it is troublesome, but does not interfere with the ordinary vocations. In the second the pain simulates migraine. In the third the pain is so severe as to render any exertion or employment impossible. It is accompanied by vertigo, ringing in the ears, and in many cases there may be a profound melancholia. The pain may be constant or intermittent. In the first it is more severe toward the evening; in the second form it comes on every evening between 5 and 7. Antisyphilitic treatment is followed by an astonishing relief of the symptoms. Another manifestation is insomnia. In many instances this may be due to headache, but in other cases there may be no headache or other symptom, the patient passing several nights without sleeping. Another phenomenon in secondary syphilis is asthenia. Like the other symptoms, it is almost confined to women. There may be inability to stand or even to leave the bed. The heart-beats are extremely feeble and the pulse almost imperceptible. There is a dullness of perception affecting all the senses, and the trophic functions are greatly in abeyance. Malignant disease, tubercle, different forms of anæmia, etc., have been diagnosed. Vague neuralgic pains may affect the sciatic or different branches of the fifth nerve. Antisyphilitic treatment, more particularly preparations of mercury, should be tried in many cases of anomalous neuralgic pain. Fournier (*Jour. de Méd.*, Apr. 10, '99).

PHARYNGO-FAUCIAL INFILTRATION.—

About the time the roseola appears, sometimes shortly before or after it, there is a development of inflammatory engorgement of the tonsils, pharynx, and soft palate, involving usually the whole faucial surface. The explanation of the involvement of the fauces and pharynx characteristic of secondary syphilis, upon the ground of lymphatic engorgement,

the primary cause of which is the abundance and superficial character of the lymphatic capillaries of the affected parts, is quite plausible. That vasodilation due to the action of syphilotoxins upon the sympathetic is an associate factor is possible.

THE PAPULAR SYPHILIDE.—The next thing observable after the roseola in the typical course of syphilis is the development of an eruption of true papules. This may appear when a roseola has not been noticed, thus seeming to be the first skin-lesion of the disease, or may even be coincident with it, but generally follows it after a variable interval: often some weeks or months. The papules are usually most prominent about the borders of the hair upon the forehead, forming a peculiar appearance termed the *corona veneris*, or venereal crown, but may be scantily scattered over the breast, back, and limbs. In still other instances they may be thickly studded all over the body. This eruption lasts longer than the roseola, occasionally remaining prominent for a number of months. It is at first of a tolerably bright-reddish hue, but this gradually fades, leaving the characteristic ham color.

SYPHILITIC ALOPECIA.—During the period of general syphilis, usually during the early months of the secondary period, often co-existent with the papular eruption, falling of the hair, or alopecia, occurs. This results from derangement of nutrition in the hair-follicles. The loss of hair may be general, but it usually occurs in patches—alopecia areata—that are quite characteristic. In rare instances the entire body is denuded of hair.

This lesion of early syphilis especially appeals to the writer as a syphilitic neurosis: a trophoneurosis, in brief. This

may be dangerous ground, for the close association of alopecia with tangible cell-deposit in other situations has led to the tacit acceptance of this lesion as an evidence of the action of the *materies morbi* of syphilis *in loco*. Some authorities believe it to be due to local poisoning of the hair-follicles, with resultant nutritive perversion.

SYPHILIS OF THE NAILS.—The nails of the fingers and toes may become affected by the syphilitic cellular infiltration, and become brittle and lustreless, or from very great infiltration and consequent nutritive disturbances—and perhaps secondary pus-infection—the destructive lesion known as syphilitic onychia may occur, presenting an obstinate ulceration around and beneath the nail.

PUSTULES, VESICLES, AND PRECOCIOUS SKIN-LESIONS.—Pustules or vesicles may form during the papular stage of syphilis. Ulcerations resembling tertiary or late secondary lesions may also occur. These latter constitute precocious syphilides.

SPECIAL MUCOUS LESIONS.—There are several peculiar lesions occurring during the period of general syphilis that are both important and interesting, but which are really mere modifications of the syphilitic papule dependent mainly upon their situation and surroundings. Mucous patches upon the various mucous surfaces or quasimucous surfaces, where they are constantly subjected to irritation from friction, heat, and moisture, are examples. These lesions are elevated *plaques* of a milky or grayish color, covered with a grayish exudate, and are not greatly unlike the primary superficial erosion sometimes seen upon the genitals. When situated about the anus, upon the scrotum, vulva, or between the digits, these *plaques muqueuses* tend to become

hypertrophied, forming broad papules or excrescences more or less elevated, sometimes covered with a quasidiphtheritic deposit, and usually secreting a foul-smelling serous secretion. These modified mucous patches are termed mucous tubercles, or condylomata.

VISCERAL INVOLVEMENT. — Visceral engorgements and infiltrations are by no means uncommon in syphilis, congestion characterizing the early secondary, diffuse infiltration the late secondary, and distinct gummy deposit the sequelar period. Tenderness over the liver, spleen, and kidneys is occasionally observed in early syphilis. Transient albuminuria is not uncommon.

Literature of '97-'98-'99.

Syphilis of the stomach is not so rare as might be believed. The lesions present themselves under various forms: hæmorrhagic erosions, ecchymosis of the mucous membrane, gummous patches, etc. When the symptoms of ulcer simplex are observed in a syphilitic person, it is natural to suppose the gastric lesion is of itself syphilitic. It should never be forgotten, when in presence of gastric ulcer, to look for syphilis in the antecedents of the patient and apply the treatment accordingly. Dieulafoy (*Canada Lancet*, Aug., '98).

To the few cases of undoubted gastric syphilis on record a fatal case is added: The microscopical features of the ulcer demonstrated its syphilitic nature, but gave no support to the view that it had been produced by the softening of a gumma. The appearance was more that of an indirect necrosis of the mucous membrane brought about by combined softening of the submucous gummatous infiltration, and obstruction and obliteration of the blood-vessels. The mucous membrane, thus deprived of its nutrition, became necrotic, was removed, and an ulcer resulted. Simon Flexner (*Amer. Jour. Med. Sci.*, Oct., '98).

In 60 cases of recent syphilis, an undoubted enlargement of the spleen yielding to specific treatment was found only

4 times. Splenic enlargement was also found twice in 4 cases of malignant syphilis. From these and other observations it appears that in early stages of syphilis enlargement of the spleen can only seldom be made out with certainty. At present, therefore, the condition of the spleen does not help one to draw any conclusions regarding diagnosis or treatment. C. Bruhns (*Deut. Arch. f. klin. Med.*, vol. lxiv, p. 451, '99).

EARLY OCULAR SYPHILIS. — During the active period we often have ocular troubles that may prove of very serious import. An infiltration of cells into the iris and ciliary body often sets up an iritis at this time, this inflammation being in no way distinguishable from the iritis produced by rheumatism, trauma, or other exciting causes. The local accumulation of cells in these cases sometimes forms a distinct nodule, or tumor, often erroneously termed "gummy tumor of the iris," but which is in nowise different in structure from the syphilitic papule. This is especially apt to occur in late syphilis, in which event it may, perhaps, be justly styled "gummous." Similar plastic nodules may form in the choroid at this period.

EARLY OSSEOUS SYMPTOMS. — Bone-pains, usually localized, and localized subperiosteal accumulations of cells termed nodes frequently occur during early syphilis, although more characteristic of late syphilis. The pain in these instances is due to intra-osseous or subperiosteal pressure produced by the dense accumulation of cells.

EARLY NERVE INVOLVEMENT IN SYPHILIS. — Syphilitic toxins occupy a very prominent position in the etiology of early syphilitic nerve disease. They also bear a more remote relation to some of the early types of nerve-phenomena. They apparently act in several ways, viz.: (4) By direct intoxication of nerve-tis-

sue. (B) By the induction of vasomotor changes via the sympathetic ganglia or the so-called monarchical vasomotor centre in the medulla. (C) Direct intoxication and irritation of blood-vessels in the nervous system. Organic or functional nervous disturbance is produced by syphilitic new growth in numerous ways, viz.: 1. By invading the lymphatics surrounding nervous structures. 2. By involving the tissues, chiefly the lymphatic vessels, surrounding the blood-vessels supplying or draining the part. 3. By invading the arterial walls. 4. By infiltration of connective and other tissues about nervous structures. 5. By involvement of the nerve or brain parenchyma proper. 6. By involving nerve-sheaths or the cerebro-spinal meninges. These various conditions act by producing: 1. Irritation. 2. Pressure-innutation, and occasionally degenerations. 3. Passive hyperæmia and œdema from venous obstruction. 4. Localized anæmia (ischæmia) from arterial obstruction. 5. Blocking up of the affected area by lymphatic obstruction.

Any of these conditions may occur in both the active and the sequelar periods, and prove very destructive. It is rare that extensive destruction of tissue from breaking down of the neoplasm occurs in the earlier nervous lesions. It is to be remembered, however, that gumma may develop at an early period from the intrinsic malignancy—precocity—of the disease.

The Period of Sequelæ, or So-called Tertiary Syphilis.—THE TUBERCULAR SYPHILIDE (GUMMY INFILTRATION).—One of the most frequent and important of the tertiary lesions, or sequelæ, is the tubercular eruption. This has been said to be due to a localized accumulation of morbid cell-material in the tissues—so-called “gummy infiltration”—that is

the type-basis of all tertiary lesions. This gummy material is termed by Wagner “syphiloma,” and is described by him as an infiltration of cells and nuclei, the cells not being capable of differentiation from the normal white blood-cells or leucocytes and the nuclei themselves presenting no characteristic appearances. He states that their morbid effects are due to a mere interference with the function and nutrition of affected parts by simple pressure. Baümeler also claims that the histological elements of syphilomata lack specific microscopical characters.

The tubercular, or gummy, lesion may develop in any situation, its favorite locations being the cellular tissue, skin, bones, liver, testes, brain, and kidneys, and, in children especially, the lungs.

Literature of '97-'98-'99.

Primary gumma of the epididymis is exceedingly rare, but late syphilis in the epididymis, not in the form of gumma, is occasionally seen. It is an infiltrating lesion of the epididymis, which generally extends into the parietal layer, giving rise to the feel of a “clam-shell” configuration. This condition is almost always associated with hydrocele. Eugene Fuller (N. Y. Med. Jour., Aug. 6, '98).

Syphilis can manifest itself in the veins. There are two forms of syphilitic phlebitis. The first is acute or subacute, and corresponds to the secondary period of the disease. The other form is chronic, and corresponds to the tertiary period of the disease: it may be localized (gumma of a vein) or generalized (phlebosclerosis). The phlebitis of both secondary and tertiary syphilis affects the veins of the lower extremities by preference. The prognosis is generally favorable, the average duration being two months. R. Heuzard (Thèse de Paris, No. 179, '98).

While intrapelvic gummata are very rare, yet in any new growth unconnected with the pelvic organs syphilis must be at least considered in making the diagnosis, and the probability seems enhanced when, on looking over re-

ports of sarcomatous tumors of the pelvis it is found that their usual seat is extrapelvic, rather than intrapelvic. The other tumors of the pelvis, exostoses and enchondroma, are usually easily eliminated by a careful palpation. Fibromata are rare and their origin doubtful, and they are certainly hard to differentiate. Echinococcic cysts are also difficult to diagnose except under extended observation, unless there be something in the history that should point directly to the true diagnosis. A. K. Stone (St. Paul Med. Jour., Aug., '99).

This gummy material is a grayish-red, homogeneous mass of greater or less consistency, that may be found in the parenchyma of any organ or tissue of the body, either as a diffused or circumscribed infiltration, but never capsulated. When this accumulation of morbid material is superficial and exposed to unequal pressure, and when it is excessive or involves the walls of the blood-vessels, thus giving rise to localized innutrition from pressure or vascular obstruction, the whole mass is liable to disintegrate and form an open lesion, or break down into pus or puruloid material that may absorb through fatty or granular degeneration without ulceration. It has been demonstrated that the longer the duration of the active period, and consequently the more pronounced the changes in the lymphatic structures produced by its lesions, the greater the liability to tertiary lesions of a severe type.

After the removal of the cells by fatty degeneration there is always a tendency to recurrence. This explains the difficulty of curing the disease at this period. This tendency is due to an increased injury to the lymphatic structures already greatly impaired by the lesions of the active period of syphilis. This impairment consists in the formation of fibrous tissues as a result of low inflammatory action mechanically set up by the cells.

This fibrous formation, of course, interferes, in a measure, with tissue-nutrition in different localities by producing changes in the vascular walls.

A careful consideration of all the facts thus far presented leads to the conclusion that the various lesions and different degrees of severity of the phenomena of the so-called "tertiary stage of syphilis" depend upon (1) the amount of damage produced by the lesions of the active period of the disease and its duration, and (2) the constitutional condition of the individual independent of specific infection.

LATE, OR SEQUELAR, NERVE AND BRAIN SYPHILIS.—The nervous lesions of late syphilis are more severe, and the prognosis much graver, than in the case of the early nerve phenomena. The accumulation of neoplastic material in and about the delicate nerve-structures, occurring in late syphilis, is associated with and probably dependent upon: 1. The local damage inflicted by the lesions of the active stage in the form of a low grade of inflammation with connective-tissue proliferation and vascular and lymphatic obstruction. 2. The debilitating effects of prolonged syphilization and the prolonged treatment necessitated by it. 3. Prolonged mental worry, with or without alcoholic or other excesses. 4. In some cases resistance to remedies occasioned by their prolonged use.

It is probable that the nerve and brain lesions of the sequelar period act entirely by producing mechanical and nutritional disturbance, the syphilitic infection proper having long since become exhausted. The manifestations of sequelar nerve-lesion are many and various.

Paralyses—such as hemiplegia, paraplegia, and monoplegias of different kinds—are apt to occur, and are due either to localized deposit of syphiloma external or

internal to the structures involved, or to diffuse interstitial deposits and proliferation of obstructive tissue. Gummy tumors may occur in the brain proper or its membranes or the latter may undergo a chronic thickening resembling chronic meningitis from other causes. The pathological results and symptoms produced vary with the location and function of the structure involved. Gummy deposits in and about the vascular walls interfering with the cerebral circulation are prolific causes of paralysis. Vascular degeneration is often the cause of those miliary aneurisms the rupture of which is at the bottom of many cases of apoplexy and hemiplegia.

The various cranial and spinal nerves are likely to become involved in sequela syphilis. This involvement may be central, involving the brain origin of the nerve, with or without a greater or less degree of coincident brain-involvement, or it may be peripheral, affecting any part or all of the distribution of the nerve. As with the brain, the nerve-lesion may consist (1) of a circumscribed or diffuse gummy deposit; (2) of sclerotic changes produced (a) by lesions of the active period or (b) by sequela gummy deposit; (3) of destruction of normal tissue-elements.

There has been something of a controversy as to the influence of syphilis upon the spinal cord. It is well known that gummy infiltration and localized deposits with consequent paralysis occur in the cord, but the etiological relation of syphilis to locomotor ataxia has been disputed. Erb maintains that 61 per cent. of cases of locomotor ataxia are due to syphilis. Fournier claims a syphilitic origin in the "enormous majority of cases." In regard to this question the writer can only say that, while the statements of these authorities may be ex-

aggerated, clinical experience seems to prove that quite a proportion of cases are due to syphilis.

Literature of '97-'98-'99.

The following statistics are based on a study of 214 cases of tabes (136 men and 78 women) from the neurological service of the Charité, in Berlin, in comparison with 600 non-tabetic patients (400 men and 200 women) from the same service: Of the tabetic men, 38.2 per cent. gave a conclusive history of syphilis, while, of the men with other nervous affections, only 7.75 per cent. gave a like history.

The non-tabetic men gave a history of chancre with symptoms following which were suspicious of syphilis in 1.5 per cent., while the tabetics gave such a history in 8.1 per cent. Of the male patients with tabes, 21.3 per cent., while denying the primary lesion, had suffered from such symptoms as would tend to a diagnosis of syphilis: of the patients with other nervous diseases only 4.5 per cent. had had such symptoms. In only 11 per cent. of the male cases of locomotor ataxia was there no evidence whatever of venereal infection, while 67.5 per cent. of the non-tabetics gave this negative history. The results with the women were practically the same. Of the tabes cases, 35.9 per cent. were surely syphilitics, 35.9 per cent. were suspicious, and 28.2 per cent. gave no evidence whatever of previous venereal disease. For the non-tabetic women the percentage in these three classes was 6.5, 10.5, and 80 per cent., respectively. Ernst Kuhn (*Arch. f. Psych. u. Nerv.*, '98).

From 15 to 25 of each 1000 persons affected with syphilis develop some specific disease of the central nervous system, exclusive of those who develop either tabes or general paresis. The greatest number of cases of cerebral syphilis result from mild and moderately severe forms of the disease. In 11 per cent. of cases of syphilis of the brain the cerebral symptoms have occurred within the first half-year after the initial affection, and in 24.6 per cent. of all the cases between 6 and 10 years after the primary

sore. The brain and spinal cord are affected much more frequently than the peripheral nerves.

Syphilis of the central nervous system is characterized, above all, by the multiplicity of the symptoms and by the tendency to remissions and relapses. No set of symptoms is pathognomonic of syphilis of the brain or spinal cord. The presence of constitutional syphilis is more easily suspected and proved from the study of the pupils than from any other symptom that the patient may present. These pupil-changes are: (1) inequality of the pupils, one contracted and the other dilated; (2) unequal response, the one reacting to light, the other failing to respond; (3) the complete immobility of the pupils, both to light and during accommodation; (4) a marked departure from the circular form in cases in which there has been no preceding iritis. Chronic forms of headache in an otherwise-healthy individual continuing for days, but often intermittent, possibly worse at night, dependent largely upon the position of the head, are of syphilitic origin. Vertigo is an early symptom. Single epileptoid seizures, transitory hemiplegias, and transitory motor aphasia occurring in the absence of renal disease are suspicious signs. Apoplectic attacks occurring in middle life in persons who have neither renal nor cardiac disease may be safely attributed to syphilis.

Ocular nerve-palsies of varying kinds are often among the earliest symptoms of *tabes dorsalis*, and it is questionable if some of these forms of *tabes*, beginning with ocular palsies, are not truly specific types of cerebro-spinal syphilis. Often brain-symptoms are associated with those pointing to disease of the lower or lowest portions of the spinal cord. Spastic or paralytic symptoms, which may be symmetrical, but often invade one side long before the other is diseased, are suggestive of spinal syphilis. The paralysis may last for years before it becomes complete. Sensory symptoms, if superadded, may remain slight. In *pseudo-tabes syphilitica* the disease often invades one leg long before it does the other.

The ataxic symptoms are often very slowly developed, and it is just in these cases that the absolute immobility of the pupil, in contradistinction to the Argyll-Robertson pupil, gives good reason to believe that what is supposed to be *tabes dorsalis* is a syphilitic *pseudotabes*. Sachs (N. Y. Med. Jour., May 27, '99).

The prognosis of late nerve and brain syphilis is notoriously bad, but in many cases more hopeful than some authorities would have us believe.

The Syphilides.—The most prominent of the manifestations of syphilis are the eruptions of the skin. These are termed "syphilides," or "syphilodermata." The syphilides are many and various, often confusing; but their classification may be rendered quite simple; thus, if papules are the essential feature of a syphilitic eruption it may be termed a "papular syphilide." In the same way the eruption may be designated as vesicular, pustular, tubercular, squamous, crustaceous, or ulcerative, and such combinations as papulo-pustular, papulous-squamous, and so on, the first part of the combined term corresponding to the feature of the mixed eruption that is most prominent. Ulcerative syphilides may be designated as superficial, deep, serpiginous, or perforative, as the case may be.

The principal distinctive lesions of syphilis that occur at various periods during its course are macules, papules, mucous patches, mucous tubercles, condylomata, vesicles, pustules, bullæ or blebs, rhagades or fissures, gummy tubercles, and diffuse gummy deposits and infiltrations. Dependent upon some of these lesions, different forms of deep and superficial ulceration, attended or followed by peculiarly-formed crusts and scars, may occur—syphilitic *ecthyma* and *rupia*—ulcero-crustaceous syphilides. Squamæ or scales in various forms and locations may develop.

PHYSICAL CHARACTERS OF THE SYPHILIDES.—The most important point in the study of the syphilides is their general characteristics. These characteristics are [Keyes]: (1) polymorphism of all lesions, including the chancre; (2) rounded form of the eruptive lesions and ulcers; (3) lividity or "ham-color," becoming coppery, then grayish, and finally white and shining as cicatrization occurs; (4) absence of pruritus and pain excepting in hairy regions, and, with respect to pain, in the bones; (5) symmetry, generalization, and superficial character of the early eruptions in all save precocious or malignant cases; (6) tendency to grouping of the later eruptions, which involve the true skin and tend to scarring; (7) tendency to circular arrangement; (8) scales comparatively thin, white, generally superficial, and non-adherent; (9) crusts irregular, thick, and adherent, and either of a greenish or black color from admixture of disorganized blood; (10) abrupt edges of both skin and mucous ulcerations, which are not undermined, are sluggish, and bleed easily [the chancreous ulcer, it will be remembered, has sloping edges]; (11) the rounded, depressed appearance of cicatrices, which are thin, movable upon the sublying tissues, pigmented at first sometimes, but eventually becoming white and shining. These scars are often crescentic or horseshoe-shaped.

In addition to the foregoing special characters of the lesions of syphilis we have attendant symptoms, such as the so-called syphilitic fever in some cases, alopecia, headache, osteocopic pains worse at night, analgesia, anæsthesia, indolent lymphitis, iritis, sore throat, and mucous patches.

The term "polymorphous" is applied to the syphilides because there is no form of skin-lesion that may not occur in

syphilis. Indeed, no single form or type of lesion is usually present: *e.g.*, a papular syphilide is rarely purely papular, vesicles, pustules, or erythematous patches being usually found at the same time, the eruption being named from the lesion that predominates.

Prognosis.—According to Baümle, the infection of syphilis lasts from eighteen months to three years, after which it is exhausted. Following the cessation of this active period, the blood and the secretions of open lesions cease to be contagious, and it may also be stated that in by far the greater proportions of cases, especially if they have been properly treated, no further manifestations are ever experienced.

The prognosis as regards severity of syphilis varies with the habits and intrinsic resistance of the patient, and the assiduity with which treatment is followed up. There is no disease the duration and course of which are so uncertain as those of syphilis. It is impossible to state arbitrarily in any given case that the disease has or has not terminated. This is more especially true when we consider that it may permanently modify the constitution of the individual, even though no typical manifestations of the disease appear after a certain time. No method of blood-examination thus far suggested to determine the existence of syphilis has proved reliable.

Literature of '97-'98-'99.

Forty-three cases tested for Justus's syphilitic reaction, which consists in a sharp transient reduction of the hæmoglobin after the administration of mercury by inunction or hypodermic injections. Seven cases were actively syphilitic, and showed a reduction of hæmoglobin after inunction of from 10 to 35 per cent.; 3 cases giving the history of syphilis without any lesions failed to react; 33 cases of various other diseases

failed to give the reaction, with the exception of one case of chlorosis, which showed a reduction of 13 per cent. of hæmoglobin; but there was no evidence of syphilis and no history that could be assumed to indicate its presence. In a case of ulceration of the larynx, it was possible to make a differential diagnosis between tuberculosis and syphilis, which diagnosis was confirmed by autopsy. R. C. Cabot and P. S. Mertins (Boston Med. and Surg. Jour., Apr. 6, '99).

The disease may manifest itself as a series of mild secondary eruptions followed by apparent recovery, or it may afford no evidence of its presence after the initial sore throat until late in life, when suddenly tertiary lesions—*i.e.*, sequelæ—crop out.

Curability of Syphilis. — Although it must be acknowledged that syphilis often causes a permanent modification of the patient's constitution, still the evidence shows that syphilis can be cured. The consensus of opinion is that it is a perfectly curable affection in by far the greater proportion of cases. We have proof of its curability in the cases of second attacks, cited by reliable authorities, and in the fact that, whatever the possibilities of tertiary lesions, they are not necessary and are undoubted sequelæ. Sequelæ syphilitics may procreate healthy children, and the evidence tends to show that the blood and secretions of tertiary lesions are no longer inoculable. If the microbial character of syphilitic infection be admitted, the spontaneous tendency to cure of syphilis is almost beyond controversy. It is part of the life-history of the germ. The prognosis of the disease as regards the life of the patient is a matter difficult to determine, as is obvious when the obscurity and wide variation in type of the more remote conditions produced by syphilis are taken into consideration. Fatal results from syphilis are usually

incidental to sequelar lesions of the arterial or cerebro-spinal systems or the viscera. They occur, as a rule, at a period so remote from the original infection, and the symptoms are so obscure as regards the specificity of their origin, that it is practically impossible to determine the primary cause of the condition in a very large proportion of cases. This much may be said, however, namely: syphilis is a disease that is essentially benign so far as danger to life is concerned. It is probable that in well treated cases the average longevity is not seriously diminished by the disease.

Literature of '97-'98-'99.

In regard to the expectancy of life in syphilis, the following points are of value: 1. Inherited syphilis is one of the most fatal of all disorders affecting mankind, and under the most favorable circumstances, apart from abortion, 90 per cent. of children born living subsequently die. 2. Acquired infantile syphilis is rare, and is easily treated, and probably a large proportion of all infants so affected survive. 3. In acquired syphilis in adults between 80 and 90 per cent. escape gummata. The percentage of patients affected with gummata who die probably does not exceed 2 per cent. 4. The expectancy of life is probably not affected by the coincidence of syphilis with other diseases, and the prospect that the patient with acquired syphilis will ever suffer from struma, cancer, or tuberculosis is exceedingly small. 5. The natural evolution of acquired syphilis in untreated cases is not in the direction of a fatal issue, but rather in the line of physical degeneration due to involvement of the nervous system and the bones without affecting the organs essential to life. 6. It is unfair to charge an extra risk for the insurance of syphilitic applicants otherwise in sound health. The syphilitic applicant for life-insurance should be examined with a view not so much as to his syphilitic history as to his condition with relation to all the other items making up a satis-

factory risk. In other words, if he has a good family history, a sound constitution, excellent habits, and has reached but not passed a satisfactory age, his expectancy of life is probably that of other individuals in similar conditions without added risk on account of syphilis. Hyde (*Med. Examiner*, Apr., '98).

When may a Syphilitic Marry?—Our best authorities assert that, on the average, marriage is safe at the end of three years. Fournier gives the following requirements for the guidance of syphilitics contemplating marriage: 1. Present freedom from specific symptoms. 2. Advanced period of the disease. 3. A considerable period of absolute freedom from symptoms since the last specific manifestation. 4. A mild type of the disease. 5. Prolonged and thorough treatment. These requirements contain in a few words all that is necessary for us to impress upon syphilitic patients who consult us with reference to their matrimonial prospects.

Congenital Syphilis.

Acquired Syphilis in Children.—Congenital syphilis should be differentiated from infantile syphilis in general. Children may acquire the disease independently of hereditary transmission. The course and phenomena of acquired syphilis in children are in nowise different from the same affection in the adult. Children may become inoculated with syphilis by kissing persons with oral or labial chancre, mucous patches, fissures, or ulcers, or it may acquire it by nursing its syphilitic mother or nurse.

Literature of '97-'98-'99.

The medico-legal question of the infection with syphilis of the nurse by the nursling may be difficult and have pitfalls for the unwary. In examining the nurse the discovery of a chancre in a position in which contagion from the

child is possible is all-important. If a sore is present its induration and the existence of an indurated axillary bubo must be especially noted. If there is no sore, relics are to be looked for—a macula which is constant, but lasts only for a few weeks; a cicatrix which is apparent in only two or three out of ten cases; induration which lasts for several weeks, and in the case of neoplastic-like chancres for periods up to five months; and a bubo which always remains for a certain time. The genital organs must be carefully examined and mucous patches in the form of papules or erosions must be distinguished from chancres, the presence or absence of buboes being especially noted. In examining the child the first point to be determined is: Is the syphilis acquired or congenital? In establishing the latter alternative the absence of chancre must be first ascertained. Next the period at which the secondary symptoms became manifested is to be noted. Every case in which secondary symptoms occur in the course of the first two months of life is congenital.

This rule is proved mathematically. Suppose that a child contracts syphilis on the day of its birth. The incubation period of chancre is three weeks at least—say, twenty days. The second incubation period averages about forty-five days—say, forty days; $20 + 40 = 60$. Therefore the secondary symptoms of acquired syphilis cannot appear before sixty days (two months). Again, the presence of lesions peculiar to congenital syphilis will decide the question—coryza, pemphigus, epiphyseal dislocations, marasmus, and cranial and nasal deformities. The examination of nurse and child being completed, the relation of the disease in one to that in the other is to be considered. There are three possibilities. Either may have contracted the disease from the other or the attacks may be independent. The previous condition of the nurse should always be investigated, her child and husband (if there is one) should be examined. The condition of the former is of the highest importance. Immunity is an almost absolute proof of immunity of the mother.

Syphilitic women may, with rare exceptions, beget apparently healthy children, but scarcely with recent secondary syphilis present. Next the priority of disease in nurse or child must be ascertained if possible. When there is hereditary syphilis of the child, previous immunity of the nurse, her infection by a mammary chancre which is in such a stage that it could have been acquired in the lactation being determined, the practitioner is not justified in swearing that her syphilis must have been acquired from the child. All that he should say is that there are reasons which authorize the belief that the nurse could have acquired syphilis from the child. There may be other sources. Fournier (Lancet, Jan. 22, '98).

The possibility of acquiring the disease by vaccination must also be remembered, although non-humanized virus is now almost exclusively used, and such an accident can only occur through carelessness. There is also the possibility of contamination through criminal assault. Such cases have no bearing upon congenital syphilis, save that great care is to be exercised in differentiation.

It is held by many that either parent may transmit syphilis to the child, although, so far as the father is concerned, the question to procreate a syphilitic child without first infecting the mother is still *sub judice*. The presence of the syphilitic microbe is probably incompatible with the life of the spermatozoa; but, until the germ of syphilis has been absolutely demonstrated, we can only claim theoretically its necessity in this particular method of transmission. The most plausible view is that, while the presence of the syphilitic germ is necessary in order that the semen should be inoculable, its presence is unnecessary in order that the father should impress the fœtus with conditions which, while not specifically syphilitic, are none the less derivatives of that disease.

Literature of '97-'98-'99.

It is a popular fallacy to regard a considerable number of cases in which the father of syphilitic offspring is syphilitic and the mother is apparently free from the disease as due to the sperm being syphilized.

It is supposed that the spermatozoön bears with it the syphilitic virus, and introduces it into the ovum at the moment of conception, and thus the offspring develops, syphilized from the start, the mother being and remaining absolutely free from taint. But it is incredible that the germ gain entrance into the spermatozoön, for the spermatozoön has not the means of ingesting foreign bodies, while there is no evidence that the syphilitic germ is amœboid and capable of making its way into the spermatozoön.

If the syphilitic virus gained entry into the unsegmented human ovum, its effects would lead to the destruction of the ovum. Fœtal syphilis must originate at a later date, and, although syphilis in the parents may doubtless have its effects upon the ovum and spermatozoa of the same, and lead to constitutional disturbances in the offspring, progressive syphilitic lesions, the true syphilomata, in the fetus and infant are *not* inherited, but are congenital; that is to say, acquired *in utero* after conception. If the mother be without sign of syphilis, and the child be syphilitic, the only satisfactory explanation is that the syphilitic virus has entered into the maternal organism and tissues, and has failed to induce any characteristic lesion at the point of entry, but has, through the placenta and chorionic villi, gained an entrance into the fœtal tissues; the process arrested in the mother has been developed in the susceptible tissues of the child, and there is here an example of the variability in the manifestations of the disease dependent upon the reactive powers of the tissues. A further word in support of this contention is found in the significant way in which the liver is affected in congenital syphilis. Extensive specific lesions of the liver in the acquired disease are relatively uncommon. They are the most

common of all lesions in the congenital affection. Were the ovum infected it would be difficult to explain why the liver should thus be especially singled out. This organ is the first to receive the blood coming by the umbilical vein; then, if the infection originates from the placenta, hepatic implication is the natural sequence. The essential difference between such congenital, or antenatal, and "acquired," or post-natal, syphilis is that in the former the virus passes immediately into the blood, and so becomes disseminated through the organism, while in the latter the dissemination is delayed. The second stage of acquired syphilis is the first stage of the congenital disease. J. G. Adami (Canadian Pract., July, '98).

SYPHILIS HEREDITARIA TARDA.—In a series of lectures at the Hôpital Saint-Louis, Fournier called especial attention to late hereditary syphilis. He reports some interesting cases in support of his view that the first manifestations of hereditary syphilis may be after the period of infancy, and even during the period of adolescence.

Literature of '97-'98-'99.

When hereditary syphilis shows itself in a child, two periods are usually selected for its appearance; the first from birth until the fifth year, during which the lesions correspond to the secondary eruptions of the acquired disease; and the second about puberty, the lesions being characteristic of the tertiary form. Between these two periods there may be an interval of health, during which no specific manifestations occur. Again, the child may show symptoms of the disease within the first five years of its birth, and, if it survives, may have no further evidence of syphilis. On the other hand, the first appearances of the disease may be noticed about puberty. When it occurs at this time it usually shows itself in the nose, and, unless its true nature is promptly recognized and intelligently treated, it may cause rapid destruction of the nasal cartilages and bones with great deformity

as the result. Inherited syphilis at puberty usually manifests itself in the female sex. P. S. Donnellan (Univ. Med. Mag., Mar., '99).

Lesions of Congenital Syphilis.—If not present at birth, lesions of various kinds develop from time to time. The writer has delivered children with a well-marked roseola. Chaps and excoriations of the quasimucous surfaces about the genitals, anus, and mouth are apt to develop, and may form true mucous patches or even condylomata. A "scalded" appearance of the anus is quite characteristic. "Snuffles" develop after a time, and the nares become so obstructed that respiration and nursing are interfered with and nutrition still further impaired. Ozæna may develop and lead to necrosis of the nasal cartilages. There is no symptom of hereditary syphilis so characteristic as snuffles. Caution is necessary in diagnosis, however. A great number of young children, especially in such climates as that of our lake-region, are affected with catarrh or coryza that presents an excellent imitation of syphilitic snuffles.

Literature of '97-'98-'99.

When atrophic rhinitis attacks a child, and its bilateral appearance cannot be satisfactorily accounted for, a very complete investigation should be made into the patient's previous illnesses and family history. If the suspicion of inherited syphilis is not then allayed, the child should have the benefit of the doubt by the administration of anti-syphilitic treatment. Later on, if the characteristic changes are found in the teeth, the eyes, or the ears, these difficulties of diagnosis are, of course, not encountered. St. Clair Thomson (Jour. of Laryn., etc., Aug., '99).

A livid macular eruption is sometimes seen, and ulcerations may form about the mucous orifices. Papular and pustular

lesions are not infrequent, and sometimes quite characteristically affect the palms and soles. Subcutaneous tubercular lesions may be seen in a few cases.

A very peculiar eruption occasionally occurs in syphilitic children that is identical in its physical characteristics with ordinary pemphigus in the adult. This "infantile pemphigus" is an unmistakable evidence of syphilis. It consists of an eruption of bullæ sparsely distributed over the skin. Sometimes but one or two blebs are present. It is especially apt to affect the palms and soles. The blebs are filled with fluid varying from slightly-turbid serum to pus, and is sometimes bloody. When the cuticle ruptures, the fluid dries into a greenish crust and ulceration occurs beneath, as in syphilitic ecthyma, or rupia.

The epithelial appendages of the body, such as the hair and the nails, are not so likely to become affected in congenital syphilis as in the adult, but a brittle, lustreless condition of the nails is occasionally noted.

Taylor has called especial attention to lesions of the bones in congenital syphilis. He has shown that the most frequent seat of the osseous lesion is the diaphyso-epiphyseal junction of the long bones, certain bones being affected with especial frequency. The possible dependence of certain cases of rickets upon hereditary syphilis is a question which, although as yet *sub judice*, is of the greatest interest and importance.

The most important manifestations of hereditary syphilis are the lesions of the viscera. Any or all of the viscera may be involved, the connective-tissue changes being especially apt to affect the liver, spleen, and kidneys.

Literature of '97-'98-'99.

The broad features characterizing the syphilitic manifestations in the infant's

liver are: 1. Syphilis may lead to the granulomatous deposits in the organ or to interstitial fibroid changes.

2. The specific granulomata may be present either in the form of minute multiple miliary gummata or of isolated larger gummata such as, in general, are regarded as being of tertiary nature.

3. It is not possible to regard the one form as secondary, the other as tertiary, for either may exist with cutaneous disturbances of the secondary type.

4. By analogy, the interstitial fibroid change, so common in infantile syphilis, would appear, in the main, to be secondary to a degeneration and necrosis of the hepatic parenchyma, induced by the action of the toxins of the syphilitic virus upon the individual liver-cells. In part it is developed in direct association with the development of miliary gummata.

While the changes seen in the adult and infantile syphilitic livers are etiologically and anatomically identical, they may present differences, due, in part, to their relative duration, in part, to the reactive powers of the hepatic parenchyma at different life-periods. J. G. Adami (N. Y. Med. Jour., Apr. 22, '99).

Notes have been made on 100 post-mortem examinations of congenital syphilis, and the principal results of this investigation are as follow: The liver is always enlarged in the mature and immature fetus suffering from syphilis, whereas in children who have lived for a short time this enlargement is often absent. In the cell accumulations of diffuse and miliary syphiloma of the liver certain cell groups are to be differentiated: the cells either resemble proliferating epithelium or else they approximate to newly-formed blood-cells. Both these varieties are seen in the normal foetal liver: they disappear, however, either shortly before or after birth. This proliferation of epithelium is increased in syphilis. The liver is the chief blood-forming organ during foetal life: the young nucleated blood-cells originate from the endothelium of the walls of the capillaries; they are more numerous in the efferent than in the afferent blood-vessels. The vessels of the portal sys-

tem in the fœtus are peculiarly rich in cells of an "adenoid lymphoid" character, which begin to resemble the adult variety at birth. The kidneys in the syphilitic fœtus are considerably enlarged; after birth they diminish in weight. The kidney changes in congenital syphilis are constant; they consist chiefly in an infiltration of the cortical blood-vessels, which after some time cause atrophy and degeneration of the epithelium of the urinary tubules and glomeruli. The kidney shares, to a slight extent, in the elaboration of the fœtal blood. The syphilitic splenic tumor is constant in the fœtus. The usual pathological lesion is a small-celled infiltration of the large and medium-sized blood-vessels. The fœtal pancreas shows an increase of weight in the syphilitic subject. The thickened coats of the umbilical vessels without infiltration is no sign of syphilis. The umbilical vessels in congenital syphilis often show specific changes, and their recognition during life would help in diagnosis. In syphilitic disease of the thymus, in addition to the formation of abscesses, the connective-tissue septa become thickened, causing compression of the lobules. Wegner's syphilitic bone disease is not always present, but the condition is never seen in non-syphilitic infants. Clinically the syphilitic infant has almost always some disturbance of the functions of the kidney. Hecker (Deut. Archiv f. klin. Med., vol. lxi, pp. 1 and 2, '99).

There is in syphilitic newborn children a marked tendency to apoplectic effusions in various situations, particularly in the meninges of the brain and probably also the cord.

Literature of '97-'98-'99.

Hæmorrhage in infants may be the only marks of congenital syphilis, especially at first; but they are almost invariably accompanied by a diminution of the coagulability of the blood similar to that of hæmophilia, and the case usually goes on rapidly to a fatal termination. Disease of the vascular walls is one of the most frequent effects of the syphilitic poison, leading to hæmorrhagic

discharges from the mouth, the bowels, the bladder, or the nose; to blood accumulations under the skin and mucosæ, or in the serous cavities and internal organs; or, finally, making the syphilitic eruption itself hæmorrhagic. Gottheil (Arch. of Pæd., '98; Internat. Med. Mag., Mar., '98).

The permanent teeth in congenital syphilis are irregular, notched, and pegged, and the conformation of the alveolar arch is imperfect. The two upper central incisors are "Hutchinson's test teeth." These are short, vertically notched, narrow, and rounded at their corners.

Interstitial keratitis is practically pathognomonic of inherited taint, and, when coincident with the syphilitic type of teeth, puts the diagnosis beyond doubt.

Literature of '97-'98-'99.

A certain relation has been observed between hereditary syphilis and strabismus. In a series of years it has been found that fully 50 per cent. of the children who squint are also syphilitic. Antonelli (Arch. d'Ophth., Oct., '98).

Treatment.—Syphilis has long been treated upon the theory that it can be antidoted by drugs. Much harm has resulted from this. A rational therapy of the disease must necessarily comprehend a knowledge of its natural evolution and conform to its natural course. The aim should be, not to stamp out quickly the disease, but to combat its *materies morbi* and reinforce the spontaneous tendency to removal of its results, until the system triumphs and the disease is finally eliminated.

Notwithstanding modern progress in therapeutics, mercury is still our sheet-anchor in the treatment of syphilis. The slow, continuous, and moderate use of mercury, for a period corresponding to the maximum time of the normal dura-

tion of the disease as nearly as may be, *without at any time producing its full physiological effects*, will generally bring about a cure that can be accomplished in no other way.

It is well known that mercury has the power of inducing fatty degeneration and elimination of inflammatory products, or "of relieving tissues encumbered with superfluous and obstructive material." This condition of the tissues is precisely what exists in syphilis, and as mercury is the best remedy at our command for the correction of such a pathological state, irrespective of etiology, it should be administered throughout the natural course of the disease, not to antidote a poison, but to remove the morbid results produced by it, as fast as they are formed, until finally the syphilitic impression upon the organism has naturally exhausted itself. We have already seen that the infection of syphilis, whatever its material substance, practically consists in the influence of infection on healthy cells, causing their rapid proliferation and obstructive accumulation. That the peculiar property of the infection is due to a pathogenic microbe of as yet unknown form is probable; but whether the morbid principle be a germ, virus, or "degraded cell," the result is the same. It is a rather peculiar fact that every method of treatment for syphilis that has been advocated for the last two or three centuries has comprised such measures as tend to produce rapid tissue-changes, and, more especially, elimination. The sweating cure; the use of hot baths, as at the Hot Springs of Arkansas; the purgation and starvation cures, Boeck's method of syphilization, and the treatment by pustulation with tartar emetic, all of which have been recommended by various authorities at different times, are chiefly active through their

power of inducing fatty changes in the tissues. In the various methods of hydrotherapy the benefit is secured by increasing elimination. This is especially important in view of the toxins elaborated by the microbe of syphilis.

The action of mercury upon the blood is of great practical interest, inasmuch as by its use diametrically-opposite effects may be produced, according to: (1) the doses used, (2) the duration of its administration, (3) the constitutional condition of the patient, and (4) the stage of the disease. (See MERCURY, volume iv.)

If the drug be given in a less vigorous fashion for a longer period, pallor and debility may result, due to depreciation in the quantity and quality of the red blood-corpuscles, defibrination of the blood-plasma, and increased tissue-waste. A certain degree of these effects is unavoidable in the treatment of syphilis; but it should be our chief aim to keep them within bounds, and thus avoid the danger of producing permanently injurious effects. Such effects as great pallor, wasting and debility, pustular or vesicular eruptions, with fever known as "mercurial fever" and marked tremors, may result from the action of mercury, and that, too, without the occurrence of ptyalism: the characteristic effect of large doses of mercury. On the other hand, small doses of mercury, in various cachectic or anæmic conditions, particularly during the sequelæ of syphilis, stimulate hæmatogenesis and rapidly and markedly increase the quantity, while improving the quality of the red corpuscles and fibrin, thus lessening hydræmia.

Iodine is another remedy that experience has shown to be curative in syphilis, and is second only to mercury. Iodine, in the form of the iodides, especially, is invaluable, more particularly in late

syphilis. The iodides—of which potassium iodide is the type—act in two ways in the cure of syphilis, viz.: first, by their own intrinsic power of producing fatty degeneration and elimination of morbid products, especially toxins; and, secondly, by liberating, exciting to renewed activity, and eliminating the mercury that is stored up in the tissues, thus assisting its action. It is evident that the first of these effects is the most important, for the iodides have a most powerful effect in resolving the products of inflammatory changes or adventitious deposits, irrespective of their cause. This, in the face of the argument that iodine can cure syphilis only by liberating mercury from the tissues, and that it is the mercury, and not the iodides, that produces the curative effects. That this is incorrect is shown by the beneficial effects of the iodides in late syphilis when mercury has never been administered.

It is the writer's opinion that treatment should begin as soon as the diagnosis is established. The duration of the initial lesion is thereby shortened, and secondary symptoms moderated, if not prevented. To save the patient from lesions upon the body or face is desirable, and only to be accomplished by early treatment.

The mildest and least irritating form of the drug is the mercurous iodide: the green or protiodide. It is best given in pill form, beginning with doses of, on the average, $\frac{1}{5}$ grain, thrice daily. This dose is to be continued for several days, and then increased one pill per day—still in divided doses—until the gums become slightly tender or the stomach and bowels disturbed. The writer generally gives the drug until the gums are slightly affected, and then gradually lessens the dose until the patient is taking about half the amount necessary to produce

slight physiological effects. This, as Keyes terms it, is the patient's average dose, and is usually from two to four pills, of the strength mentioned, daily. This should generally be continued—with certain intervals of rest—throughout the course of treatment. It is often well to substitute from time to time some of the other mercurials for the mercurous iodide.

Literature of '97-'98-'99.

A colloid form of mercury is of great advantage, from a pharmacological standpoint, in the treatment of syphilis. This form of mercury is free from irritation, and with it exact dosage may be attained. Its absorption is certain and rapid. It may be obtained in the form of ointment, solution, pills, tabules, or plasters. A. Lottermoser (*Jour. de Méd. de Paris*, Feb. 12, '99).

It is the physician's duty to tell his patient that if he wishes to get well he must take remedies for at least three years, and if any doubt exists at the end of that time he had best add another year, especially if he has matrimonial intentions. As already stated, no syphilitic patient should be permitted to marry under three years from the appearance of the chancre. In the case of women a still longer period is advisable.

Literature of '97-'98-'99.

In the event of pregnancy, when the father is syphilitic at the stage when the disease may be transmitted, and when the mother is healthy, two classes of cases are considered: (1) when the pregnancy is the first one, supervening shortly after marriage; (2) when several previous pregnancies have resulted disastrously in abortion or in early death of the child. The child can be safeguarded by antisymphilitic treatment of the mother, even when she is healthy. The cardinal points of treatment are that the treatment should be begun as soon as possible after the onset of pregnancy, and that mercury is the best

drug to administer. If the iodide is given in conjunction with mercury, all the better. Inasmuch as it is not an adult, but the fœtus, that is being treated, small doses should be given. The treatment should be continued during the whole time of pregnancy. Fournier (*Sem. Méd.*, Nov. 30, '98).

A difficult item in the management of most cases of syphilis is convincing the patient that it is necessary for him to avoid the use of liquor and tobacco for an extended period, and that he must abstain from the various dissipations and excesses to which he has been accustomed. This point must be insisted upon, however; and, with good conduct upon the part of the patient assured, half the battle will have been gained.

Literature of '97-'98-'99.

A large number of those under treatment for syphilis and other venereal diseases have seriously impaired the efficiency of the British navy and army. In 1880 for primary syphilis, 32,223 days were lost; for secondary syphilis, 128,059; for gonorrhœa, 40,392. The figures for 1897 were: for primary syphilis, 96,335; for secondary syphilis, 49,764; for gonorrhœa, 77,054. Intemperance is undoubtedly responsible for a large percentage of the cases, so that anything which can diminish the amount of intemperance will cause a decrease in the number of cases of venereal diseases. Good naval barracks should be substituted for depot-ships, advice should be given to young sailors as to personal cleanliness, early marriages should be encouraged, and preference should be given to healthy people in making appointments. E. E. Mahon (*Brit. Med. Jour.*, Aug. 19, '99).

In some cases mercurial inunctions or mercury-vapor baths must be wholly depended upon. Both are very efficacious in obstinate skin-lesions. The general dissemination of mercurous vapors over the surface of the body explains, in great part, the beneficial action of inunctions.

Literature of '97-'98-'99.

The treatment of syphilis must be long continued, for eight months or one year, and it is certain that most of the cases in the British navy and army do not receive treatment for nearly so long as this. By the intramuscular method treatment may be continued as long as necessary after leaving hospital, the men coming up for treatment once a week. Twenty thousand injections have been personally given with only 1 bad result, and in that case an abscess formed. The following prescription is preferred, as it causes but little pain—1 drachm of mercury, 2 drachms of lanolin, and 4 drachms of carbolic oil (1 in 20); of this 10 minims are injected into the buttock. Major F. J. Lambkin (*Brit. Med. Jour.*, Aug. 19, '99).

In syphilitic diseases of the brain and nerves the patient should be mercurialized as soon as possible, and it is best to do this by inunction. Iodide of potassium should be given in fairly large doses. Sixty grains should be given during the day, this dose doing as much good as if 90 or 120 grains were given daily. The main point is to get the patient under the influence of mercury as soon as possible. James Taylor (*Clin. Jour.*, May 3, '99).

Inunctions are useful in all stages. This method is the safest of all. The blue ointment of the United States Pharmacopœia is the best preparation. The best time for treatment is the hour of retiring, in a room at an even temperature. The early treatment—that is, prior to the secondary eruption—is of no value. The ideal end of treatment is to stop when the disease is cured. The cases of reinfection frequently reported are probably no cases of reinfection, but the remanifestation of the old condition, or due to failure in absorption. The chronic intermittent method of treatment has no advantages over the symptomatic plan of treatment. B. Lapowski (*N. Y. Med. Jour.*, May 6, '99).

In using inunctions the patient should first be instructed to take a bath at 100° F., and then sponge himself with a 2-per-cent. solution of carbolic acid. After having divided the body into the follow-

ing 11 subdivisions, namely: 1 and 2, the arms, palms, and axillæ; 3 and 4, the legs and soles; 5, the neck and head; 6 and 7, the breast and abdomen; 8 and 9, the thighs, with groin and Scarpa's triangle; 10 and 11, the back from the seventh cervical vertebra to the lower part of the gluteal region. One or two of the parts should be selected for friction, and from 40 to 60 grains of freshly-prepared and well-triturated blue ointment used for each inunction. If one employs a rubber other than himself, he should anoint the hands with a simple cerate in order that he may not absorb any of the mercury. If the patient's condition and *physique* are such as will permit, he should take 2 or possibly 3 Turkish baths a week. From 50 to 100 inunctions may be given with proper intermissions, and then they may be stopped for a shorter or longer interval, as indications and conditions require. In women taking this treatment, tonics should at the same time be given. Fumigation treatment is not to be followed as a routine plan. The patient is enveloped in blankets, India rubber or Mackintosh covering lined with flannel and tight fitting around the neck, and calomel, 20 to 40 grains, with a Maury or Lee lamp used to volatilize the salt and generate steam at the same time. They should never be taken after meals, but preferably at bed-time, the patient at once retiring, if at all possible. The time consumed, as in the inunction treatment, is thirty minutes. R. R. Campbell (Hot Springs Med. Jour., Pt. 15, '99).

Welander has recommended a method of using mercurial ointment in syphilis which has many advantages over inunction. It consists in the wearing of a sort of apron covered with the ointment. A piece of gauze or flannel, 20 inches long and 16 inches wide, which is fastened with tapes about the neck and waist, is spread daily or every few days with from $1\frac{1}{4}$ to 2 drachms of gray ointment. The cloth can be worn on the chest or back. The patient remains from ten to fourteen hours in bed, but wears the cloth also during the day. The ointment is spread by the patient himself. The method rests on the old theory of Ger-

hardt, that the "inunction cure" is nothing else than an "inhalation-cure." Welander's method has been personally employed in 102 cases of recent and old lues. The time required to obtain results was about that needed in other methods, but the new procedure has the advantage of simplicity and cleanliness over the inunction-treatment, and of the absence of pain, and of convenience over injections. These patients were directed to spread daily for three weeks $1\frac{1}{4}$ drachms of ointment on flannel or gauze, and during the spreading to bend as low as possible over the cloth, and to consume at least ten minutes in the spreading of the ointment. In the next three weeks the cloth is spread every two days. C. Stern (Münch. med. Woch., Feb. 7, '99).

Thirty patients treated with mercuriol, a new preparation of mercury. Mercuriol is a preparation in which the mercury is reduced to very fine particles, and is free from the objection of aggregating into large masses.

The method is based on the fact that mercury easily amalgamates with aluminium or magnesium, from which it can be separated by the addition of water, forming a hydrate. Mercuriol contains from 40 to 80 per cent. of metallic mercury in fine amorphous particles. When exposed to warmth, air, and humidity, the aluminium and magnesium are oxidized, and mercury set free. Mercury was found in the urine in all the 30 cases. The method used was that of Welander, where the drug is put in a woolen bag worn next the skin.

One and one-fourth drachms of mercuriol were used daily for the first five or ten days; afterward every second day. The duration of treatment varied from thirty to forty days. This method is better and more cleanly than inunction. Ahman (Arch. f. Derm. u. Syph., Apr., '99).

It is sometimes necessary to bring a patient under the influence of mercury very rapidly: *e.g.*, in cases of syphilitic iritis, in which a few hours' delay might be fatal to the integrity of the eyes. In such an event calomel, in doses of $\frac{1}{12}$

grain every hour, will accomplish the desired result. If necessary, pytalism can be produced in this manner within twenty-four to forty-eight hours.

Another rapid and efficacious method is Lewin's method of hypodermic injection. From $\frac{1}{16}$ to $\frac{1}{8}$ grain of mercury bichloride, in combination with $\frac{1}{30}$ grain of morphine and a small quantity of sodium chloride, is dissolved in 15 minims of distilled water, and injected into the cellular tissue, preferably of the buttock, once or twice daily; a minute dose of cocaine may be advantageously combined with the injection.

Taylor advises a mixture of calomel and sodium chloride, 5 parts of each, suspended in 50 parts of distilled water. Of this fluid an ordinary hypodermic syringe may be injected every eight or ten days. The sides of the buttocks and the back beneath the shoulder-blades are the best sites for the injections.

Literature of '97-'98-'99.

The direct introduction of mercury into the blood exercises a most useful influence and improvement takes place almost at once. Small doses should be given at first and gradually increased. If, however, too large doses are used, or it is continued too long a time, mercurial anæmia may develop. Careful antiseptic precautions should be maintained. Lindstroem (*Presse Méd.*, May 18, '98).

Eighty-four cases of syphilis were treated by the intravenous injection of cyanide of mercury. The arm is rendered aseptic by washing with a solution of carbolic acid; a rubber tourniquet is applied to the upper part of the arm to make the veins stand out. A fine needle of an hypodermic syringe, containing 20 minims of a 1-per-cent. solution, is then introduced into the chosen vein in the direction of the blood-stream. The tourniquet being removed, the fluid is injected into the vein, the needle is withdrawn, and an antiseptic swab applied

to the point of puncture for a few minutes. Such an injection is repeated every morning, unless some contra-indication exists. In the eighty-four cases treated in this manner, the complications met with were very slight and rapidly disappeared. All the cases with but one exception showed very marked and rapid improvement. The average stay in the hospital per case was 23.2 days. In the worst cases other adjuvants, such as cod-liver-oil, iron, and correct diet, were resorted to. In all cases special attention was paid to the general health. In the tertiary and some of the rupial cases the iodides of sodium and ammonia were used. All cases on being discharged from the wards were advised to undergo a further and prolonged course of the ordinary methods of treatment in the outpatient department of the hospital. Arthur Chopping (*Lancet*, Feb. 18, '99).

The intravenous method for treating syphilis should be regarded as an exceptional measure, of infinite value when other recognized methods have failed—in glossitis, phagedænisism—and in cases demanding rapid action, or early intense mercurialization—malignancy. It should be reserved for lesions of exceptional severity where other methods of medication have failed. In the differential diagnosis of certain neoplasms in suspected tertiary syphilis, or in the presence of the numerous pseudophenomena or grave symptoms of obscure origin, intravenous injections of mercury constitute the only thorough test, of infinitely greater value than iodines. Dudley Tait (*Jour. Amer. Med. Assoc.*, June 17, '99).

Case of a woman who two years and a half previously had contracted syphilis from her husband. During the whole of that period she had suffered from severe syphilitic symptoms, notwithstanding the most varied treatment—mercury, iodide, iron, etc. A similarly obstinate case was noted in a man. The mercury in both was used in every possible way—by mouth, by inunction, and by intramuscular injection. The woman had had forty calomel injections, and the man no fewer than 120 without any curative effect up to date, demonstrating most

clearly how little foundation there is in the dogmatic statements put forward by some observers that syphilis cannot resist calomel injection. A certain amount of benefit was obtained from serum injections. Fournier (*Ann. de Derm. et de Syph.*, July, '99).

For females with very weak stomachs, and in children, the gray powder or hydrargyrum cum creta is an excellent mercurial preparation.

It is an almost universal custom to use iodine and its preparations only in the late periods of the disease, and chiefly in tertiary lesions; but it will be found also that in many cases of obstinate secondary lesions they will not yield until the iodides are given. It is well to give a few weeks' course of the iodides from time to time, throughout the course of mercurial treatment. A small amount of the nascent mercuric iodide may be given at the same time if thought best. In precocious syphilis, in which destructive skin and mucous lesions or nerve-changes come on early in the disease, the iodides are sometimes our chief reliance. It is in late syphilis, however, that the iodides will be found most reliable, especially if combined with mercury in the form of "mixed treatment." Gummy lesions require an excess of the iodides; but, in all cases after the lesions are under control, a prolonged mild mercurial course should be instituted. This is the proper method of treating the deeper lesions of the brain, spinal cord, bones, viscera, and testicle, tubercular lesions of various kinds; the various scaly eruptions; and those later syphilides that tend to aggregate themselves in groups or become particularly obstinate.

NEW REMEDIES FOR SYPHILIS.—There is a tendency on the part of the profession to recommend various new and questionable preparations in the treatment of syphilis. Certain vegetable prepa-

arations have enjoyed a more or less long-lived popularity. Sarsaparilla was long thought to be a specific. Among the new preparations are cascara amarga, berberis aquafolium, and stillingia, alone or in combination. A trial of these things demonstrates their unreliability, and shows more plainly than ever the value of iodine and mercury. As bitter tonics the vaunted vegetable preparations are all more or less useful, but as specifics they are arrant humbugs.

LOCAL TREATMENT OF THE CHANCRE.—Important in this connection is (1) to avoid caustics, (2) to avoid grease, and (3) to keep the parts as dry as possible and perfectly clean. Another important point in the management of severe chancre is the maintenance of rest. Movement and friction are often responsible for serious complications of chancre. That sexual intercourse should be interdicted goes without saying.

The only exceptions to the rule regarding caustics are mixed sores, with a minimum of induration, and exulcerated sores that become sluggish and refuse to heal after induration has nearly or quite disappeared. In the first instance pure carbolic acid followed by fuming nitric acid is admissible, but the galvanocautery, preceded by cocaine, is better. In sluggish ulcers stimulation with silver nitrate may be warrantable.

The old-time black and yellow washes are serviceable, although the part cannot be kept dry under their use. A solution of mercuric chloride, 1 to 1000, is very useful. A plan recommended for the application of the bichloride is to wash the lesion with a weak solution of common salt. Calomel is now sprinkled upon the part, a small amount of nascent and active bichloride being thus formed. The writer has used this plan for condylomata quite successfully. The best

absorbent for the dry treatment is the powdered oleate or stearate of zinc. Simple calomel is also serviceable.

Literature of '97-'98-'99.

The following local treatment for soft chancre has proved very successful in many cases. The ulcer and the surrounding skin is first washed over with soap and water, and then with perchloride lotion. After this the chancre is frozen with chlorethyl, and the superficial layer of the chancre is removed with a sharp razor. The hæmorrhage is controlled by touching the raw surface with a stick of nitrate of silver. The wound is covered with iodoform powder,

and a zinc-oxide plaster is applied. This plaster should be renewed every twenty-four hours. The treatment is usually continued for four or five days. Unna (*Monats. f. prakt. Derm.*, 26, 6, '98).

Sodium sozoiodolate is of great value in soft chancre. It is quite free from smell, and is not poisonous. At first it should be mixed with some inert power and it is apt to cause a smart burning pain when applied, but after a few days the affected part grows less sensitive, and the pure preparation may be applied freely. Grivzoff (*Berl. klin. Woch.*, No. 50, '99).

G. FRANK LYDSTON,

Chicago.

T

TENDONS, BURSÆ, AND FASCIÆ, DISEASES OF.

Tenosynovitis, or Thecitis.—Inflammation of a tendon or tendon-sheath may either be *acute*, when it is the result of injury, or *chronic*, when it is due to tuberculous infection.

ACUTE TENOSYNOVITIS.—In this form traumatism may give rise to suppurative inflammation, owing to the invasion of pyogenic microbes, the result, in many cases, of insufficient attention to antiseptics when the wound is dressed, or to the presence near the injury of a suppurative process. It may also result from repeated, though slight, contusions, such as those to which the hand is exposed in many occupations. Injuries of this kind in the palm of the hand are well known under the term palmar abscess. (See below.) Acute tenosynovitis may also appear as a complication of syphilis, gonorrhœa, and rheumatism. It is termed whitlow, felon, or panaris (see below) when the tendon-sheath of a finger is the seat of the acute suppurative process.

Palmar abscess may be due, as stated,

to repeated contusions, but also to extension of tenosynovitis of the fingers, especially when the abscess is located on the flexor side of the little finger and the thumb, owing to the connection of their synovial sheaths with the general sheath common to the tendons of the palm. The three other fingers, as is well known, possess separate sheaths. When suppurative inflammation is present in the palm, high fever may occur, and the pain is severe in proportion to the resistance of the overlying tissue. Here, again, the pus may burrow in various directions or insinuate itself between the metacarpals to the dorsum, and passing beneath the annular ligament reach the tissues of the forearm and beyond. Death has been known to ensue in such cases from pyæmic infection. The palmar lesion may, in turn, become aggravated; necrosis of the carpus may occur and dangerous hæmorrhages suddenly appear through involvement of a large vessel in the suppurative process.

Felon, or Whitlow.—The term "felon" is often applied to a superficial inflam-

mation of the finger or toes around the nail and sometimes causing loss of the latter. This variety has been treated under NAILS, DISEASES OF (volume v). The form considered here is that to which "felon" more properly belongs: inflammation of the deeper tissues, including the tendon and its sheath of the distal phalanx. This is usually due to traumatism,—a blow or crush,—and develops soon after the receipt of the injury, though sometimes only toward the end of the second day. Severe pain, heat, throbbing, and more or less fever betoken the presence of quite an acute inflammatory process. The pain becomes extremely severe and almost unbearable if surgical measures are not resorted to. If the abscess be allowed to proceed without relief, extension toward the hand may follow or the pus gradually works its way toward the surface, forming a volcano-like mass, which, upon healing, leaves the thumb deformed—sufficiently in some cases to impair its usefulness.

Treatment.—The treatment depends, of course, upon the condition presented at the time the case is seen. In its incipient stage an acute tenosynovitis may sometimes be cured by rest, elevation of the part, and application of cold compresses or prolonged baths in a solution of borate of sodium, especially if small doses of iodide of potassium are given internally—with copious draughts of water. In the vast majority of cases, however, such a favorable result is not reached, and the inflammatory process proceeds to suppuration. A free incision including the tendinous sheath, exposure of all sinuities that appear suspicious, and curetting, all performed under strict antiseptic precautions, represent the only safe procedures. Thoroughness at this time avoids not only a repetition of

the operation, which otherwise often becomes necessary, and the likelihood of a deformity is greatly reduced. General anæsthesia is to be preferred.

In *palmar abscess* the danger of delay is especially great, as already shown. A free incision is imperatively demanded, the line followed being that of the metacarpal bone nearest the abscess. In doing this, however, the location of the palmar arch should be borne in mind, and the artery avoided. Should it accidentally be cut both ends should be carefully picked up and ligated. In some cases, the abscess appears to have "broken" spontaneously early in the history of the case, and a flow of pus seems to verify this conclusion. The pus originates in small superficial abscesses, which sometimes form in addition to the deeper and greater one, and rupture early through the pressure exerted from below. They tend to mislead the operator by causing him to delay the evacuation of the main abscess. The danger involved not only includes extension of the purulent process beyond the hand, but also destruction of the tendons of the latter, followed by permanent flexion of the finger: the "*main en griffe*."

In *whitlow*, or *felon*, the general indications are similar, but the chances of arresting the inflammation early are greater if the case is seen early. This may often be effected by keeping the finger wet with alcohol, diluted with an equal quantity of camphor-water. A thin bandage well soaked with the solution is wrapped around the finger and oiled silk is carefully wrapped around the whole to prevent evaporation. A strong solution of borax, or a bichloride solution 1 to 3000 may also be used in the same manner, but carbolic-acid solutions should not be employed, several cases of gangrene having been ascribed

to their use. If after forty-eight hours no improvement is noted, a free incision, reaching the bone in the distal phalanx and down to the tendons in the two others, is needed, the sheath being laid open. When this is not resorted to early, the distal phalanx may be found necrosed; hence the deformity left in so many cases of whitlow. If necrosis is present, dead portions of the bone should be removed; but little apprehension need be felt, since it rarely extends beyond the epiphyseal line. In the two lower phalanges, however, necrosis is of more serious import; the dead bone must either be removed or the finger amputated, according to the amount of osseous tissue involved.

Chronic Tenosynovitis.—Although this term implies an inflammatory process, the disease it is intended to represent is, in reality, but a manifestation of tuberculosis in the sheath. A nodular, more or less spindle-shaped swelling following the long axis of a tendon is formed, which contains, besides liquid, small bodies resembling rice or melon-seeds; hence called “riziform” bodies. These are either buried in the sac-wall or float freely in its liquid, and are found to contain, upon microscopical examination, tubercle bacilli. The local disease may assume a fungous form, and not only destroy the tendon, but spread to neighboring tendons and joints. Tuberculous tenosynovitis usually develops near the wrist, and much less frequently in the tendons of the fingers, knee, and ankle. It gives rise to but little suffering, and, as a rule, interferes but slightly, if at all, with the functions of the affected extremity until well advanced. Its progress is, as a rule, quite slow. It may, if the health of the patient is materially improved, disappear spontaneously, or become fungous after penetrating the

superficial tissues, as does typical tubercular abscess. It may occur as the complication of a joint tuberculosis. The riziform bodies facilitate diagnosis by conveying to the finger exerting pressure upon the swelling a crepitation recalling the presence of gravel.

TREATMENT.—The tendency to relapse which characterizes this disorder renders it imperative to thoroughly eliminate the local trouble and to treat the general dyscrasia as well. When the sac is purely cystic—*i.e.*, devoid of fungoid vegetations—a small incision, followed by evacuation and the injection of a solution of iodoform in olive-oil or in ether, will often suffice. When riziform bodies are present, however, more effective means are necessary, since they represent as many foci for tubercle bacilli. The sheath should be laid open and its interior surface and the tendon thoroughly cleared with the curette. Fungoid vegetations still further complicate the case, and, unless every vestige be removed, including affected external tissues, sheath, and tendon, recurrence is sure to occur. Asepsis is of the greatest importance, general toxæmia occurring readily if proper precautions are not taken. The general treatment should include the administration of creasote and other measures indicated in pulmonary tuberculosis.

Wounds and Injuries of Tendons.—

DISPLACEMENT.—A tendon is sometimes displaced from its normal position by a violent motion in which its normal axis of traction is more or less departed from, the sheath being torn. Often it immediately returns to its normal position, but sometimes it does not, and local pain, with impairment of motion, result. The peroneus brevis probably shows the greatest predilection in this direction, and comparatively often slips out of its

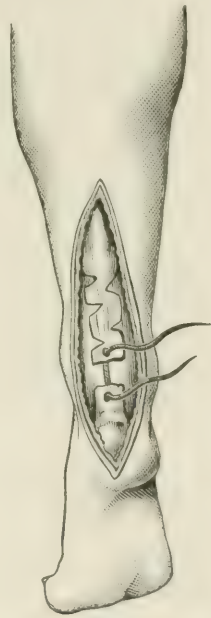
groove, being felt over the malleolus when the foot is flexed and extended. Displacement is most frequently observed in connection with dislocations and fractures, and in the latter a tendon may insinuate itself between the fragments, and thus prevent approximation and union.

Treatment.—By gentle manipulation with flexion or extension of the extremity, as required to reduce the tension upon the tendon, the latter can usually be restored to its normal position. Once displaced, a tendon is liable to again leave its bed. A suitable retentive dressing and bandage should be so applied as to hold *in situ* until thorough repair of the torn sheath has occurred.

RUPTURE.—Under the influence of a sudden effort the contraction of a muscle may exceed the resistance of the fibres of its tendon, and the latter gives way. The tendon of the rectus femoris above and below the patella, the tendo Achillis, the tendon of the triceps near the olecranon, and that of the biceps near the forearm are those which are most exposed to this accident. The rupture is usually complete, and a cavity may readily be felt where before the tendon was continuous, the gap being increased by extension. When the knee is the seat of rupture, there is marked effusion in the joint, and the patella is drawn upward: a deformity very readily noticed. There is a distinct snap when the rupture occurs, immediate loss of power in the limb, and sometimes severe pain.

Treatment. — Approximation of the ends by full extension of the limb, application of retention bandages and splints, and immobilization of the limb at once suggest themselves. If these can be carried out satisfactorily, perfect union occurs at the end of two months, and, with a little care for a few weeks

subsequently, perfect cure ensues. This happy result is not always met with, however, and in the majority of instances the tendon-ends cannot be held together by simple means, especially when the muscle draws the proximal end away to such a degree that traction has to be exerted to bring its extremity down to the lower. In such a case, therefore, it is



Elongation of the tendo Achillis. (Poncet.)

(Revue d'Orthopédie.)

better to suture the ends. This is especially important when the traction is due to the action of large muscles, such as those of the calf or thigh. Under careful antisepsis this can now be done without the least danger, even at the knee. The incision should, if possible, be made to one side of the tendon, and not over it, to reduce the chances of adhesion. Rupture of the tendo Achillis is sometimes managed with difficulty, or tends, if union is obtained, to cause pes equinovarus. Poncet avoids this by cutting the edges of the tendon zigzag fashion to

elongate it, as shown in the cut, or by Czerny's method, described below.

WOUNDS OF TENDONS.—Tendons are susceptible to traumatism of any kind, but their density causes them to resist penetration. Puncture-wounds, therefore, are seldom met with, the point of the instrument being diverged in the majority of instances. The sheath, however, is usually torn, but it quickly recovers, if pyogenic organisms have not been introduced. Incised wounds are of little moment unless the entire tendon is cut, when, with a snap, it assumes the relations outlined under RUPTURE. In the latter, however, the solution of continuity being subcutaneous, pyogenic elements are not introduced; in rupture due to the thrust of a knife, sword, chisel, etc., the contrary is likely, and the surgeon should always assume that he is dealing with an infected wound. He will thus insure an early recovery in all cases.

Treatment.—Whatever be the cause of the laceration, the ends should be stitched with buried catgut sutures, care being taken that the ends be carefully placed in apposition, or, better still, overlapped. It is sometimes necessary, in order to recover the proximal end, to slit the sheath, or to free it some distance from its surroundings to do this. The suture holds best when passed through transversely about one-third inch above each free end. In some cases, as in bullet wounds, much of the tendinous substance has been carried away, while the softer and more elastic sheath remains, at least to a greater extent. If the ends of this are united, so as to form a continuous canal, a new section of tendon will be formed if the vitality of the sheath was sufficient from the start.

Lengthening of the tendon may also be resorted to. Either Poncet's or

Czerny's method may be resorted to. Poncet's is described above. Czerny's consists in cutting the tendon half-through some distance above the end, then longitudinally toward the latter until near it. The portion thus partly detached is then turned down toward the other free end of tendon and sutured to it. If too great an extent of tendon has been lost, an animal tendon may be transplanted and sutured to both free ends. This forms the basis of a new tendon, the animal tendon being usually absorbed.

Bursitis.—Bursæ, protective cushions developed in the cellular tissue, may be normally provided, or acquired, when certain parts, superficial or deep, are exposed to unusual friction or pressure. These may become inflamed through injury or overuse, constituting *acute bursitis*, or through continued irritation, constituting *chronic bursitis*. The bursæ often become involved in diathetic processes, rheumatism, gout, and syphilis especially.

ACUTE BURSTITIS.—An acute inflammation of a bursa may be serous or purulent, and, as stated, is usually due to injury. When located superficially there is marked swelling, redness, and local heat. When an inflamed bursa is situated in the deeper tissues, the swelling can only be detected with difficulty, if at all, and the pain, especially on motion, is severe. General febrile symptoms often appear when a deep bursa is involved, especially when there is a tendency to suppuration, this being likely to extend. The inflammatory process sometimes extends to a neighboring joint, including the synovial sac, which is easily penetrated. The diagnosis can usually be established by judging the effects of motion. Extreme abduction or adduction of the humerus, for instance, causes

severe pain, if the inflamed bursa is under the deltoid; when the bursa between the quadriceps extensor and the femur, or that under the ligamentum patellæ, is the seat of the inflammatory process, flexion of the leg upon the thigh becomes painful, through the pressure thus exerted upon the bursa.

Treatment.—Absolute rest in bed and immobilization, by placing the extremity in a splint and pressure, elevation of the part, and cold or hot antiseptic applications are indicated. If the active symptoms persist notwithstanding these measures, the sac should be aspirated if the fluid is serous, followed by pressure or free opening, if pus be present, and the purulent discharge completely evacuated, and a saturated solution of iodoform in ether injected. Lugol's solution mixed with an equal quantity of glycerin is also useful.

CHRONIC BURSITIS.—Chronic inflammation of a bursa is met with much more frequently than the acute form. It develops insidiously, is unattended by pain, and manifests itself only by marked swelling, which varies in density according to the thickness of the bursal wall. This becomes quite dense sometimes, and conveys to the touch a feeling of hardness suggesting bone. In some cases it may be thin and the cavity be greatly distended with fluid. The harder bursa is usually separated into various cavities by thick, fibrous partitions, or the interior is studded with villous growths, which sometimes become detached and form riziform bodies. Occasionally it undergoes calcification.

Literature of '97-'98-'99.

Sixty cases of disease in the bursa under the ilio-psoas and in the bursa beneath the aponeurosis of the gluteus maximus over the great trochanter have been personally collected. The subiliac

bursitis, of which there were fourteen examples, gives rise to a swelling below Poupart's ligament, which may extend downward as far as the middle of the thigh; the swelling is smooth, more or less sensitive, and usually fluctuating; there may be neuralgic pains, from pressure on the adjacent nerves, and venous thrombosis from pressure on the vessels. The movements at the hip-joint may be interfered with, and the limb may assume an abnormal attitude; *e.g.*, abduction, external rotation, and slight flexion, resembling that of hip-joint disease. It is to be differentiated from the latter by the absence of rigidity, of shortening, and of tenderness over the joint. The development of a bursal hygroma may occupy several years. The bursitis over the great trochanter resembles that under the ilio-psoas, and it is to be diagnosed from a periarticular abscess in hip disease and from disease in the trochanter itself. The bursa itself is not infrequently the seat of tuberculosis, and more often on the left side than on the right. Sülzer (*Centralb. f. Chir.*, No. 21, '99).

HOUSE-MAID'S KNEE.—This popular term is applied to chronic swelling of the prepatellar bursa, as a result of continued or repeated pressure while scrubbing, etc. It is located immediately at the knee, and the globular swelling projects anteriorly when the patient is sitting. It is usually quite large, the size of a small orange, and, its wall being comparatively thin, it generally fluctuates. At times it becomes irritated through continued pressure and may become slightly painful, the limbs at the same time becoming somewhat stiff and weak at the knee.

Treatment.—Aspiration followed by injection and subsequent removal of a 1 to 1000 solution of corrosive sublimate or a solution of iodoform suffices in many simple cases. If the presence of pus is detected, a free incision is resorted to nowadays, and that without the least

danger if asepsis is carefully adhered to. An opening into the sac may be made on each side, and a drainage-tube passed through to insure complete evacuation of the fluid. When there is ulceration the same incisions are of service, but lower down. Again, the sac may be completely extirpated through a lateral incision.

BUNION.—This consists of an enlargement of the bursa over the metatarso-phalangeal articulation of the big toe, but which may also present itself over other joints of the foot. It is often due to the pressure of ill-fitting shoes, which not only exert pressure upon the bursa overlying the articulation, but also tend to force the big toe away from its normal line and the metatarsal extremity of the second phalanx outwardly. The bursa thus finds itself pinched between the bone and the overlying leather. Bunions may cause but little trouble, when not compressed, but, irritated in the manner outlined, they become inflamed and at times exceedingly painful; the skin becomes highly congested and tense; tumefaction occurs, accompanied by accumulation of fluid in the bursa; and locomotion becomes difficult. In some cases suppuration follows; the pus may then burrow through the bursal wall, give rise to cellulitis, and involve the metatarso-phalangeal joint.

Treatment.—The shape of the foot-wear is of primary importance in the treatment of the cases. The inner side of the shoe should accommodate the bunion in such a manner as to avoid all pressure, while the great toe should have ample room to project in a straight line from the foot, and not be pushed toward its median line. Pointed shoes are pernicious in this connection. A change of foot-wear is sometimes sufficient to bring about recovery. The local treatment is

that of bursitis. Iodine painted over the projection is advantageous. When the applications become irritating, a salve of equal parts of cosmolin and tannic acid, as advised by Gross, soon brings on resolution. Tapping or the evacuation of pus by incision, followed by curetting of the bone, sometimes become necessary. These are absolutely safe proceedings if conducted antiseptically.

Literature of '97-'98-'99.

In bunion the writer makes an incision about an inch in length on the dorsum of the toe. In a mild case, after retracting the tendon of the extensor proprius pollicis outward, he chisels off all the overprominent portion of the inner side of the head of the metatarsal bone, removing as much bone as necessary to do away with all protuberance; he then sutures the wound and lets it heal under one dressing. In severe cases the head of the metatarsal is removed with a chisel or bone-forceps, and the prominent inner side of that bone cut off.

The dressing must be carefully done and close attention given to the after-treatment, which should include the application of a plaster splint. The writer advises never to operate during an acute attack of inflammation, always to treat the deformity, and never operate on the bursa. Parker Syme (N. Y. Med. Jour., Oct. 2, '97).

Ganglion.—This name is given to a rounded tumor usually about the size of half of a hazel-nut, which generally forms on the back of the hand. It may be soft and yielding when pressed upon, or exceedingly hard, suggesting the presence of an osteoma. It is not painful even under pressure, and gives rise to no inconvenience. When, however, as in the case of pianists, the fingers are moved rapidly and with power long periods at a time, a sensation of weight or stiffness is experienced and occasionally

slight pain. According to Volkmann, a ganglion is a pouch-like projection of the synovial membrane of a joint in the majority of cases, and rarely arises from a tendon-sheath. It contains a thick, honey-like liquid, thus forming an independent cyst, or a synovial hernia.

TREATMENT.—Pressure or a sharp blow causes the sac to rupture, the liquid being promptly absorbed. This rather brutal—and therefore unsurgical—method is now generally supplanted by subcutaneous divisions with a small bistoury, under strict antiseptic precautions. The small incision being made, a piece of iodoform gauze is placed over the sac, and, pressure being exerted with the thumb, the fluid is quickly evacuated and dispersed. Large tendinous tumors sometimes require excision.

Contraction of Tendons and Fascia.—**DUPUYTREN'S CONTRACTURE.**—This is an obstinate form of contraction affecting principally the palmar fascia, prolongations of which, as is well known, run by the side of the fingers, and are attached to the periosteum of the first phalanx. By contracting, these prolongations gradually cause the fingers to close upon the palm of the hand and to remain in this position permanently. The ring-finger is usually that first involved, but in the majority of cases the three fingers on the ulnar side of the hand are contracted, the index finger and thumb rarely. Either hand may be affected, but occasionally both become so flexed as to paralyze their usefulness. It usually begins as a small, hard mass near the metacarpo-phalangeal articulation; contraction of the corresponding finger begins and proceeds until the nails fairly dip into the tissues of the palm.

Dupuytren's contracture has been traced to many causes: the rheumatic and gouty diathesis and other general

conditions: but in practically all cases there is a history of local injury of a persistent kind, such as the continuous forcible handling of a certain tool, the pressure of a cane-knob, etc. Again, it is occasionally observed after prolonged illness in which the general vitality of the organism has been severely taxed. It is rarely observed before middle age, and almost always in men. The patient is usually possessed of good general health.

Treatment.—The progress of the contraction is steady until the hand becomes totally crippled, and the only effective means at our disposal are surgical. Efforts at extension are unavailing, but, when this is tried, thick elevations are seen to form in the palmar cavity and to push its superficial tissues upward. It is upon these bands that efforts at liberation should be concentrated. A small tenotome should be introduced at various places under each, and the attachment of the bands to the overlying skin so freed as to permit of full extension of the fingers. A splint should then be applied and worn, not only until recovery of the wounds, but during several days subsequent thereto. Then daily passive motion and massage should begin, coupled with a mild galvanic current, until the motions of the fingers have been completely recovered.

In some cases it is necessary to obtain complete extension, to remove the hardened palmar fascia. An incision is made along the length of each band, and the skin is carefully dissected up from the latter. This being done, the hard tissues constituting the band proper are separated from their surroundings, then cut out as completely as possible. These cases need close watching, since the danger of recurrence is always great, and passive motion, massage, etc., should be

resumed as soon as there is the least evidence that the affection is returning.

Literature of '97-'98-'99.

Pendulum apparatus for contracted fingers and hand consists of an arrangement that can be attached to the side of a table, applicable to increasing the motion of stiff finger-joints. Patients who resist any attempt at passive motion in the ordinary way, after a short time under the correction of the pendulum apparatus obtain considerable motion. Nebel (*Zeit. f. orth. Chir.*, p. 17, B. 5, H. 1, '97).

TRIGGER-FINGER.—According to Féré, two groups of this disorder may be recognized: the organic and the functional. The causes for the organic variety may be found in the tendons, fascia, muscles, or in conditions which will tend to modify the directions of muscular action, and the movements of flexion and extension. The functional class may be reflex, following local irritation, or may be a local manifestation of certain neuropathies. Cases of this class may arise independently of any voluntary movements.

The disease consists of a peculiar and sudden locking of the finger when it is flexed or extended to a certain point. It remains in the position acquired notwithstanding ordinary efforts to bring it to another position. A powerful voluntary effort sometimes succeeds, however; but in some cases, the assistance of another person is necessary. The disorder is usually limited to one finger, the middle finger being that most frequently affected. The majority of cases are observed in females. The chances of recovery under appropriate treatment are good.

Treatment.—The treatment of trigger-finger, as outlined by Riesman, consists in the application of iodine, electricity, massage, passive motion, and fixation of

the finger by means of a splint. In veterate cases have been treated by operation, which usually consists in removing whatever obstacle to free movement exists. If an underlying cause, like rheumatism or gout, is ascertainable, proper general methods are to be instituted. In cases accompanied by pronounced paræsthesial phenomena, the use of ergot may be tried.

TENSION OF THE EYEBALL, DISORDERS OF.

To preserve the shape and proper relations of the refracting surfaces of the eyeball, the sclero-corneal coat is kept distended by its contents, which normally press outward with a force equal to the weight of a column of mercury 25 or 30 millimetres in height. To nourish the tissues contained within the outer coat of the eyeball there is a continuous secretion of nutritive fluid; and this fluid, just as constantly, must escape from the eyeball to avoid overdistending it. In pathological conditions the tension of the eyeball may be increased or diminished. Increased tension is indicated by + T 1, + T 2, or + T 3, which indicate different degrees of hardness; and diminished tension is indicated by — T 1, — T 2, or — T 3, the higher number indicating the greater departure from the normal.

Glaucoma.

Increased tension is generally called *glaucoma*, from the Greek, *γλαυκός*, sea-green. The term was applied on account of the greenish hue of the pupil in elderly people, when dilated, as it commonly is, in glaucoma. But the increased intra-ocular tension is now recognized as the essential characteristic of the disease.

Symptoms.—The eyeball is found more resistant to pressure than normal. This is tested by pressing on it above or below

the cornea through the partly closed lids. The tips of the two forefingers are commonly used. In the early stages the increased resistance may not be noticeable or it may only be present a part of the time.

A very early symptom is the appearance of colored rings around distant lights at night. The colors are arranged as in the solar spectrum, with the violet toward the light. These halos may be absent in glaucoma, or present when the tension is not increased. Proximity of the iris to the cornea, shallowness of the anterior chamber, frequently precedes any outbreak of other symptoms; and in the later stages the anterior chamber may be obliterated, the iris coming in contact with the cornea. Dilatation of the pupil usually attends glaucoma. In the early stages the pupil still responds to light and convergence, and varies in size from time to time with the variations of tension. Later it becomes widely dilated and fixed. When the tension of the eyeball is much increased, or has increased rapidly, the cornea is found comparatively insensitive to touch.

Pain occurs, and is severe in most cases. It may be limited to paroxysms, or may be constantly present. It is often referred chiefly to the brow or cheek, or the temple or side of the nose. It may be mistaken for neuralgia or the pain of inflammation. In glaucoma that has lasted some time, the large tortuous veins that emerge from the sclera some distance back from the corneal margin are dilated and prominent. During the paroxysms there is generally a marked pericorneal redness. When the tension is very high, or has risen rapidly, the cornea will be found hazy,—“steamy,”—and may hide the deeper parts of the eye.

When the media are clear the ophthalmoscopic appearances are characteris-

tic. In cases not too recent the optic disk is cupped or excavated deeply, the excavation extending to the extreme margin of the disk, and having abrupt or overhanging sides over which the retinal vessels appear sharply bent. The retinal veins are often dilated and the arteries rather small. The arteries may be seen to pulsate, especially where they pass over the margins of the cup; and the normal pulsation of the veins may be increased. The optic disk is often surrounded by a ring of choroidal atrophy having an edge that shades rather gradually into the normal choroid, called a halo-atrophy.

Diagnosis.—Glaucoma may be distinguished from CATARACT by pain, dilatation of the pupil, narrowing of the field of vision, cupping of the optic disk, and absence of opacity of the media except during inflammatory exacerbations. From NEURALGIA it must be distinguished by the fundus-changes, and the impairment of visual acuteness or the field of vision, that are present in simple glaucoma, which is most liable to be confounded with that disease. From IRITIS glaucoma is distinguished by the shallow anterior chamber, the dilated pupil, the impairment of the field of vision, the absence of so-called punctate keratitis, and the marked exacerbations and remissions. From KERATITIS glaucoma may be known by the symptoms just enumerated, and the smoothness of the corneal surface. The discrimination between different varieties has been indicated in describing them.

Etiology.—Glaucoma may possibly be caused by excessive secretion of fluid within the eyeball; or by alterations in such fluid which hinder its escape. But the causes that most commonly produce it, and are best understood, act by causing obstruction of the channels of outflow.

The chief channels for the escape of fluid from the eye pass from the periphery or "angle" of the anterior chamber through "Fontana's space" to a circle of lymphatic and venous channels in the adjoining sclera, called the canal of Schlemm. Adhesion of the periphery of the iris to the cornea or pressure of the iris against the cornea closes these channels.

The liability to glaucoma increases with age; and Priestley Smith has pointed out that the crystalline lens, like other epithelial structures, continues to grow until old age, diminishing the space between it and the ciliary processes, and increasing the liability of these processes to be pressed against the iris and close the outflow channels.

The use of a mydriatic is liable to cause glaucoma through thickening of the iris at its periphery during dilatation of the pupil. Exclusion of the pupil by iritic adhesions is likely to lead to pushing forward of the iris by fluid from the deeper parts of the eye, and blocking of the outflow channels. Dislocation or swelling of the crystalline lens is likely to do the same thing. Causes of swelling of the ciliary processes and iris, as overweariness, and physical or mental shock may cause outbreaks of glaucoma; and constitutional conditions, particularly gout, have been accused of causing it. Pain, insensitiveness of the cornea, and cupping of the optic disk are due to the excessive intra-ocular pressure.

Varieties. — Glaucoma in its typical form is marked with exacerbations, during which the tension of the eyeball is increased, with pericorneal redness, increased pain, diminished acuteness of vision, and generally increased severity of all the symptoms. This has been called *inflammatory glaucoma*. It is either *acute* or *chronic*. Sometimes the exacerbation

is so severe as to destroy light-perception in a few days, or even a few hours: *glaucoma fulminans*. When the increase of tension is preceded or accompanied by retinal hæmorrhages it is called *hæmorrhagic glaucoma*. Glaucoma quickly returning after iridectomy and compelling the removal of the eye is *malignant*.

When no noticeable exacerbations occur, but the increase of tension and impairment of vision are gradually progressive, the condition is called one of *simple glaucoma*. When glaucoma arises in an eye not previously diseased it is called *primary*. When it follows other ocular disease or injury, as wounds causing swelling of the crystalline lens, inflammation of the iris, or intra-ocular tumor, it is called *secondary glaucoma*. When all sight has been lost, and the tension is continuously elevated, the case is said to be one of *absolute glaucoma*.

Prognosis.—Glaucoma not efficiently treated ultimately causes complete and hopeless blindness, usually with a period of great pain. This end may be reached in a few days or only after many years. Treatment may save what sight remains, or some that has been very recently lost may be restored. But vision that has been lost more than a few days or weeks cannot be regained. The prognosis for hæmorrhagic glaucoma is extremely bad. Simple glaucoma often pursues its course unchecked by any treatment. Inflammatory glaucoma is quite amenable to the usual remedial measures if applied early. Secondary glaucoma can be cured by removal of its cause, as by the extraction of a swelled or dislocated crystalline lens. The prognosis must always be guarded, for cases mild in the beginning may become fulminating or malignant.

Treatment. — Iridectomy is the chief remedy for glaucoma. It is best done by making with a narrow knife an incision

a little back from the corneal margin close to the periphery of the iris. One-fifth of the iris should be removed, quite up to its ciliary attachment. The after-treatment resembles that of cataract extraction, except that the patient may be allowed more freedom.

Sclerotomy may be anterior or posterior. The former consists in making a scleral incision parallel to the corneal margin much as for iridectomy, but longer and not completed, a bridge of sclera being left standing at the middle of it. Posterior sclerotomy consists in making an incision in the direction of an antero-posterior meridian of the eyeball, usually below the tendon of the external rectus, allowing a little of the vitreous to escape.

The common causes of glaucoma must be avoided, particularly the use of a mydriatic, unless iritic adhesions (posterior synechiæ) are present. If operation is not permitted, myotics—as physostigmine (eserine) and pilocarpine—may be instilled, combined with cocaine. Taking blood from the temple and bathing the eye with water as hot as can be borne tend to diminish pain.

INCREASED OCULAR TENSION IN CHILDHOOD leads to distension of the eyeball: *buphthalmos* or *hydrophthalmos*. The eye becomes visibly distended, especially the cornea. The pupil remains small, the eye is commonly myopic; vision deteriorates, and is likely to be entirely lost. In some cases iridectomy has seemed to check the course of the disease.

Diminished tension of the eyeball follows all perforating wounds, and continues with corneal fistula or cystoid cicatrix. It may also be caused by injuries that cause no wound of the ocular tunics, apparently by nerve-influences. Softening of the eyeball commonly attends chronic cyclitis or iridocyclitis, in

which connection it indicates serious intra-ocular changes.

Temporary softening of the eye attended by pain, photophobia, and deep hyperæmia of the eyeball is called *ophthalmomalacia*. The attacks may last hours or days, and are liable to recur. Rest of the eyes, hot applications, and weak solutions of eserine are indicated.

EDWARD JACKSON,
Denver.

TETANUS.

Definition.—An acute or subacute infectious disease caused by a specific organism, the tetanus bacillus, and characterized by violent tonic spasms with marked exacerbations and remissions. Tetanus is also called TRISMUS and LOCK-JAW, and, when occurring in infants, TRISMUS NASCENTIUM or TETANUS NOBILITATUM.

Varieties.—The infection usually takes place through an open, though often inconspicuous, wound: *traumatic tetanus*. When it occurs spontaneously or after exposure to cold, no wound being discoverable, it is called *idiopathic tetanus*.

Symptoms.—Following some injury, slight or severe, and usually ten days after—although longer periods of incubation have been noted—the first symptoms of tetanus appear. There are slight stiffness of the neck, and some rigidity of the muscles of mastication with interference with the movements of the tongue. In a small proportion of cases chilly feelings may be complained of, and the wound, if unhealed, is apt to become tender and painful.

Literature of '97-'98-'99.

Yawning has often been noticed to be a forerunning symptom of tetanus. Henry Gray Croly (Brit. Med. Jour., Jan. 8, '98).

There is often some muscular twitching in the vicinity of the wound, and, as the disease gradually develops, the muscles of the jaw begin to exhibit marked tonic spasms, resulting in the typical "locked jaw." The facial muscles are also often attacked, producing distortions of facial expression. The head is often drawn backward and the dorsal muscles become involved, causing backward bending of the vertebral column. As the spasm extends to other trunk-muscles, the body may be bent forward, backward, or to one or other side according to the relative severity of the contractions in different muscle groups. The muscles of the hands, arms, and legs are comparatively little affected. In addition to the tonic muscular spasm, the least source of irritation, such as a light touch of hands or bedclothes, moving the limbs, a breath of air, a loud sudden noise, will cause, so soon as the attack is well established, a severe clonic exacerbation of spasm. The muscles of the whole body are thrown into violent contraction, with distortion, and often with great interference with respiration and phonation, or with spasm of the glottis causing partial asphyxia. This clonic exacerbation subsides after a few minutes or sooner, to be repeated under the slightest provocation. In the intervals some tonic spasm of the muscles persists. During the paroxysms there is usually profuse sweating; the pulse-rate runs up to 130 to 150; and in some cases there is hyperpyrexia, 110° to 115° F. being seen in fatal cases just before death. There may be retention of urine from spasm, and in any case the secretion is apt to be scanty. At first the tonic spasm causes comparatively little pain, but, after the attack reaches its height, the pain during the paroxysms is most excruciatingly intense. The

mental faculties remain unimpaired throughout the attack. Death may occur from asphyxia or cardiac dilatation during a paroxysm, or at later stages of the disease from exhaustion. The attack endures from a few days to several weeks.

Diagnosis.—In typical cases following injury no difficulty in diagnosis could arise. The muscular spasms in STRYCHNINE POISONING simulate those of tetanus to some extent, but in strychnine poisoning the muscles of the jaw are not first, if at all, affected; in the intervals between the paroxysms there is no stiffness nor tonic spasm; the symptoms develop rapidly, not gradually, as in tetanus; and the history of the case is different.

The HEAD TETANUS of Rose, with its well-pronounced trismus, dysphagia, and facial paralysis, might be mistaken for rabies or hydrophobia, but in hydrophobia the trismus and involvement of neck- and back- muscles is wanting.

The most constant and striking feature of cephalic tetanus is the facial paralysis. It mostly affects all the branches of the facial nerve, sometimes the lower part of the face has alone been involved. This facial paralysis practically always occurs on the same side as the injury, but it has been seen on the opposite side. The spasm on swallowing is less constant, and therefore less characteristic, than the paralysis of the seventh. Paralysis of some of the other ocular nerves has been noted in some few cases. E. F. Trevelyan (*Brit. Med. Jour.*, Feb. 8, '96).

In TETANY the nature of the spasm is different, and it especially involves the hands and feet.

In HYSTERIA some symptoms of tetanus may be simulated, but the presence of other hysterical phenomena and the history of the case should preclude error. A bacteriological diagnosis is also possible, and should, whenever possible, be made by means of cultures and stained

preparations from pus of the wound and from the earth of the locality where the wound was received. A mouse inoculated with pus from a tetanus-infected wound will die within a few days: a fact which may be made use of in diagnosis.

Etiology.—The disease was at one time especially common in infants in the West Indies, and in all countries newborn children are particularly susceptible. After the first month of life, however, infants seem less liable to the disease than adults, the period of greatest danger being from 30 to 45 years. In general, males are more frequently affected than are females, and the negro races are more susceptible than are the white. Horses, cattle, sheep, and other animals are also frequently attacked. All forms of the disease are much more common in hot countries than in temperate climates. The disease is often especially frequent in certain localities (endemic tetanus), the soil seeming in such places to be peculiarly rich in tetanic bacilli. In almost all cases of tetanus there is traceable trauma, and many even doubt the possibility of the occurrence of the disease without a solution of continuity of tissue sufficient to permit the entrance of the pathogenic organism. Idiopathic cases following exposure to cold do, however, occur. The most favorable forms of wounds for the development of tetanus are lacerated and contused wounds, especially where nerves are involved. Injuries in hands or feet are more apt to permit infection than are wounds in other parts. The disease, however, may follow surgical operations, extraction of teeth, vaccination, burns, frost-bite, insignificant scratches or puncture injuries from splinters, needles, tacks, etc. It may follow childbirth in women, although of late years this puerperal form of tetanus has been

much less common than it was before the days of asepsis. In all wounds however received the probable source of contamination is the soil. A clean wound, of course, involves much less danger than a dirty one.

Bacteriology.—The tetanic bacillus growing under favorable conditions is a characteristically drum-stick-shaped organism, whose peculiar feature is a considerable enlargement at one end, in which enlargement a bright, round spore can be seen. The non-spore-bearing bacilli are long, slender, having rounded ends, are motile, and are numerous when conditions of temperature and other requisites to perfect development are unfavorable. The organism will not grow in the presence of the smallest amount of oxygen, which fact renders its successful cultivation a matter of some difficulty. It stains readily by Gram's method, and with ordinary watery solutions of the aniline colors. It is widely distributed in Nature, but especially common in certain soils in thickly-inhabited countries; in particular, soils which have been manured. It is also present in the atmosphere, especially a dust-laden atmosphere, and has been shown in the scrapings of the walls and floors of hospitals in which tetanic cases have been treated. It is always found in the pus or other discharge from tetanus-infected wounds, and is frequent in the intestinal discharges of men and animals affected with the disease.

Literature of '97-'98-'99.

The bacillus of tetanus was sought in the fæces of 10 healthy grooms and other persons employed to attend on horses, and found in 3 cases, while in the fæces of 90 peasants positive results were obtained in only 2. Pizzini (Rev. d'ig. e san. pub., No. 5, '98).

The organism possesses exceptional

powers of resistance, retaining its virulence for months in dried pus, and surviving many antiseptic solutions and exposure to heat, etc., which would prove quickly fatal to other pathogenic germs. The specific powers which cause the symptoms of tetanus are generated by the bacteria in their processes of growth and nutrition, and have been isolated by Brieger from filtrates of several-weeks-old cultures in the shape of two basic substances: tetanin and tetanotoxin; and Brieger and Fraenkel have also isolated from these culture-products an intensely poisonous toxalbumin.

Literature of '97-'98-'99.

The tetanus bacillus remains localized in the part of the body to which it has been introduced, and does not invade other parts. In its development, however, certain extremely poisonous substances are produced, known as the tetanic toxin. This toxin is absorbed into the blood, and thus reaches all parts of the body. It seems to have been shown experimentally that the tetanic toxin possesses a special affinity for the cells of the cerebro-spinal axis, where it is deposited from the blood and becomes fixed. Editorial (Univ. Med. Mag., Feb., '99).

The phenomena of tetanus are readily produceable in lower animals by the action of minute portions of these toxins introduced into the tissues.

Literature of '97-'98-'99.

The result of observers with regard to the passage of the toxin to the nervous system, directly along the nerves, has been personally confirmed. It was found that a certain dose of the toxin injected into the substance of an exposed nerve, the puncture afterward being closed, could produce tetanus, while no result followed the injection of the same quantity into the muscles after a portion of the nerve in connection with the part had been removed. Marie (Ann. de l'Inst. Pasteur, July, '97).

There exists a peculiar affinity between the tetanic toxin and certain cellular complexes of the central nervous system, and this affinity is manifested not only in the case of the central nervous system of the living organism, but also in that of the dead spinal medulla and brain; that is to say, isolated from the organism. When an injection is used of an emulsion of these organs,—that is, when the cerebral substance circulates with the blood,—the tetanic toxin, finding the nervous substance in circulation, is combined with it before proceeding to exercise its action on the cellular elements of the central nervous system, which is thus spared. Wassermann and Takaki (Presse Méd., Jan. 22, '98).

Pathology.—The disease is characteristically and purely toxic in nature, and without typical or constant morbid anatomical changes. There is apt to be a small, slightly-suppurating wound, with some congestion of adjacent parts. The nerves in the vicinity of the wound have been noted as inflamed, red, and swelled, but characteristic lesions in the nerves or nerve-centres are wanting, although in the brain and spinal cord minute hæmorrhages, distension of capillaries, perivascular exudation, and pigmentary or other degenerative changes in nerve-cells have been described.

Literature of '97-'98-'99.

No post-mortem lesion has been discoverable in the cord in tetanus until recently, when, in common with other poisons, Marinesco (Compt. Rend. de la Soc. de Biol., July 4, '96) described softening of the gray matter found in animals killed by tetanus. The poison is, no doubt, a direct irritant to the cord. Pitfield (Ther. Gaz., Mar., '97).

Hypostatic congestion of the lungs is a frequent post-mortem finding, and rupture of muscle-fibres as a result of violent contraction has been seen.

Prognosis.—The prognosis is grave,

about 80 per cent. of traumatic and 50 per cent. of idiopathic cases proving fatal.

Literature of '97-'98-'99.

From personal experience and observation as to the mortality following the ordinary sedative treatment of traumatic tetanus it is concluded that the disease is almost always fatal, unless decidedly slow and subacute in its onset and course. Gwilym G. Davis (*Annals of Surg.*, Aug., '98)

The two main elements in the prognosis of tetanus are the length of incubation and the temperature. The shorter the incubation, the more serious the case; if it be only two, three, or four days' long, the case will be almost certainly fatal. Any rise of temperature is ominous, and, the higher it is, the less likely is the case to recover. Rapidity of pulse and respiration is also a bad sign. Courmont and Doyon (*Practitioner*, June, '99).

Puerperal tetanus is rarely recovered from, and the tetanus neonatorum of infants is almost always fatal.

The prognosis of tetanus of the newborn is not so bad as formerly thought. Eight cases recovered out of forty collected. J. L. Smith (*Arch. of Ped.*, Dec., '95).

Literature of '97-'98-'99.

In 6 cases of puerperal tetanus personally observed, there was operative interference with the labor in all. Chill, fever, and fetid lochia were all present. The symptoms came on in from 6 to 19 days after the delivery, being uniformly fatal in from 2 to 3 days. All of the reported cases, 21 in number, have been collected, showing that in 1 case only did recovery take place. Rubeska (*Archiv f. Gynäk.*, vol. liv, No. 1, '98).

(See also ECLAMPSIA, PUERPERAL, volume iii.)

The least dangerous cases are those in which the spasm remains localized in the jaw- and neck- muscles.

The afebrile cases offer a more hopeful outlook than do those in which the tem-

perature is elevated. The number and violence of the paroxysms bear a direct relationship to the severity of the disease. When these paroxysms are frequent, severe, and involve all muscles of the trunk, recovery is scarcely hoped for.

Treatment.—The most important therapeutic question at the present time is as to the value of the tetanus antitoxin. It has been observed that animals which are very slightly susceptible to tetanus, such as the dog, may be rendered immune by the injection into their tissues of the tetanus-virus, in doses of gradually increasing strength; and that the serum of animals so treated has the power of conferring immunity upon other more susceptible animals, or of at least increasing their power of resistance to the tetanic toxins. The serum of immunized animals may be preserved for use by the addition of a small proportion of carbolic acid. The tetanic antitoxin of Tizzoni and Cantani is obtained from the serum of immunized dogs by treatment with alcohol. Experiments upon the lower animals with the tetanus antitoxin show that animals inoculated with fatal doses of tetanic virus often recover when treated with antitoxin.

The results thus far obtained by the antitoxin treatment in man, however, have not been especially favorable, probably on account of the fact that the existence of tetanus is unsuspected until the amount of the poison is sufficient to cause spasm and too late to give good results from any specific treatment. Some favorable effect is, however, often noted, and the antitoxin or immunized serum should always be used, as it is probably the best single remedy now at hand. It is manufactured on a large scale in somewhat the same manner as is diphtherial antitoxin, and can be procured of almost all prescription druggists.

Literature of '97-'98-'99.

The mortality for all cases of tetanus treated without antitoxin is 60 per cent., and 30 per cent. for all cases treated with antitoxin. Lambert (*Annals of Surg.*, Dec., '97).

Of 24 collected cases of tetanus treated by antitoxin, 12 recovered and 12 died. The results are much better in the less violent cases with a long incubation period than in rapid cases. Webber (*Lancet*, '97).

The mortality of 113 cases treated by antitoxin and in a like number treated by antispasmodics was 63 per cent., but attention is called to the fact that fatal cases treated without antitoxin are not reported, while those treated with antitoxin usually are. Goodrich (*Annals of Surg.*, Dec., '97).

During seventeen years in the Cologne Hospital the death-rate of tetanus was 62.5 per cent. Of 98 cases collected from the literature which received tetanic serum, 41 died, which is a mortality of 41.8 per cent. Th. Weischer (*Münch. med. Woch.*, No. 46, S. 1284, '97).

The amount of serum required to prevent the development of the disease increases enormously with the time that elapses between the injection of the poison and that of the serum. Donitz (*Deut. med. Woch.*, July 1, '97).

Since the experiments on animals show that the antitoxic serum has little or no power over the disease when it has become well established, it is important to begin the dosing at the earliest possible moment. When injected, the serum should be heated to about 1° F. above the rectal temperature; if more than this, the body-temperature will rise; if less, the heart will be slowed and collapse may occur. The best way to administer the serum is by intravenous infusion.

The success of a very severe case personally treated points to the possibility that in the cases reported heretofore the dose has not been sufficient, and demonstrates the practicability of the intravenous infusion of 500 cubic centimetres of animal serum in cases where

it is necessary. S. J. Mixter (*Boston Med. and Surg. Jour.*, Oct. 6, '98).

In giving intracerebral injections the following method is recommended: The anterior half of the scalp is first shaved and cleansed, then the point at which the injection is to be given is determined with the aid of a craniometer. In order to inject the fluid into the lateral ventricles, so as to avoid the motor centres, a point, 2½ to 3 centimetres from the bregma has been found to meet all indications. After cocaineizing the scalp in this region a hole is drilled through the scalp and cranium; upon withdrawal of the bone-drill, the hypodermic syringe is inserted and the medicated fluid injected into the lateral ventricles. Albert Kocher (*Centralb. f. Chir.*, No. 22, '99).

From an examination of recent literature a list has been compiled of 25 patients treated by the intracerebral injection of antitoxin, with 11 recoveries and 14 deaths. Intracerebral injection does not interfere with treatment by hypodermic or intravenous injection of antitoxin, and the causative wound must be dealt with by thorough scraping and disinfection, or by amputation. Albert Carless (*Practitioner*, July, '99).

The following case should inspire greater confidence and hope in the curative effects of the injection of antitoxin into the dura mater. The wife of a cabinet-maker, aged 29, on June 2d, fell down the cellar-stairs, and, being in the third month of pregnancy, aborted the next day. On June 13th signs of tetanus appeared. The symptoms were unusually severe, and the prognosis most unfavorable. Altogether the woman received 9 grammes of antitoxin,—4 of Behring's serum and 5 of Tizzoni's,—nearly twice the supposed curative dose, and half of it in the dural sac. On the seventeenth day of the disease she was in good spirits, and in a satisfactory condition, though the trismus had not entirely disappeared, with a pulse of 103 to 120. V. Leyden (*Berl. klin. Woch.*, No. 29, '99).

The general treatment of the case is quite important. The patient should be

placed in a darkened quiet room. No one but the doctor and nurse should have access, and every possible source of irritation which could cause a paroxysm of muscular spasm should be rigorously excluded. The diet should be liquid, nourishment by enema being employed if the trismus is marked. Of remedies for combating the spasm chloroform is most quickly efficacious, but the relief obtained is liable to be temporary only. Nitrite of amyl will occasionally abort a paroxysm. Large doses are most usually beneficial, sometimes almost certain. Other, but less valuable, remedies are Calabar bean, the bromides, and curare. Continuous warm baths are helpful in most instances. Ice to the spine is also recommended, as is bleeding and the application of the galvanic current.

Literature of '97-'98-'99.

The carbolic-acid treatment of tetanus is strongly favored. The method of Baccelli is as follows: If the tetanus is of traumatic origin, the wound is thoroughly cleansed with a strong antiseptic solution (either corrosive sublimate or carbolic acid). The patient is then placed in as quiet an apartment as can be obtained, the ordinary rules of diet, etc., are carried out, and subcutaneous injections of a 2-per-cent. solution of carbolic acid given at two- or three-hour intervals. If the case is one of only moderate severity, commencing doses of about 3 grains in the 24 hours may be used. This dose should, however, be rapidly increased to at least double or triple the quantity. Along with the carbolic acid other remedies, as morphine or chloral, may be given, as thought necessary. From the study of Italian literature, it would seem that: 1. Carbolic acid gives better results in tetanus than does the antitoxin treatment. 2. It acts by antagonizing the toxin and by quieting the nervous system. 3. It should always be given hypodermically, and in large-enough doses, cases of tetanus being remarkably tolerant toward

it. 4. Other methods of treatment should be continued, of which the discoverer lays special stress on the local disinfection of the wound. H. C. Wood, Jr. (Merck's Archives, May, '99).

Wasserman—reasoning from the assumption that destruction of the nerve-cells in the cord and brain during tetanic convulsions or toxæmia might underlie the immunity thus conferred—discovered that the liquid obtained by rubbing up fresh brain or spinal cord with normal salt solution had the power of conferring a temporary immunity, and could even neutralize the effect upon lower animals of an injection of tetanic toxin ten times larger than would, under normal conditions, cause death.

Literature of '97-'98-'99.

It is possible to render animals immune against tetanus by injecting a culture of Fraenkel's pneumococcus. It was found that the action of tetanic poison on an animal already inoculated shortens the period of immunity of Fraenkel's pneumococcus. The immunity conferred by injection of pneumococcus differs from that produced in other cases by the extreme rapidity of its action; if employed a short time before or even at the same time as the more severe poison, it is still able to act quite efficaciously. This material loses its power and becomes almost inactive against tetanus poison, although it seems to retain its own power of conferring immunity against its own original bacillus. Tizzoni (Gazz. degli Osp., Mar. 6, '98).

Local surgical measures, such as excision of the wound or scar or thoroughly cauterizing the same, are usually advised and should be employed early, and in any case if evidence of wound irritation appear, thorough cleansing and other antiseptic precautions being resorted to.

E. D. BONDURANT,

Mobile.

THIOL.—Thiol is a substance composed of hydrocarbons and about 12 per cent. of sulphur. As prepared by Riedel, it occurs as a soft, gray powder or scales; it also occurs in a liquid form containing about 40 per cent. of thiol. The liquid occurs as a thin, brownish-black neutral fluid having the odor of oil of birch. It is readily soluble in water, but less soluble in alcohol and ether, forming a clear mixture which is rendered more perfect by the addition of glycerin. It is free from local irritant effect. Thiol resembles ichthyol in chemical composition, and is said to produce similar physiological and therapeutic effects. It is said to be non-toxic and is preferred as an antiseptic and local stimulant to ichthyol on account of its more agreeable odor.

Schemmer reports cases of herpes zoster and dermatitis herpetiformis successfully treated with a 10-per-cent. solution of thiol used twice daily. He recommends it in other erythematous disorders.

Moncorvo has employed it among children for the purpose of diminishing suppuration and removing cutaneous affections, either of parasitic nature, such as tinea and favus, or those due to constitutional disease, such as tuberculosis and syphilis.

Literature of '97-'98-'99.

Thiol can be used in inflammations of every description. Infiltrations are resorbed without the formation of pus, making incision unnecessary. In severe carbuncles, after removal of the pus, thiol allays inflammation when applied around the wound on the infiltrated parts, and pain ceases entirely.

Lymphangitis, even phlegmons caused by panaritium, insect-bite, and other causes, quickly disappear under thiol treatment. The best results are obtained with liquid thiol as supplied by the manufacturers, not with that prepared from powdered thiol by the addition of

water. Wirz (Deut. med. Woch., July 1, '97).

Thiol is most valuable in gouty or rheumatic sore throat on account of its large proportion of sulphur. W. A. Wells (Phila. Med. Jour., Apr. 15, '99).

Constipation has been relieved by daily doses ($\frac{1}{8}$ grain) of thiol.

Gottschalk found thiol beneficial in cases of pelvic exudation and in acute and chronic endometritis. He employed a 10- to 20-per-cent.-glycerin solution upon vaginal tampons, and gently rubbed the abdomen once a day with a thiol ointment. He applied the remedy to the cervical canal, using an applicator wrapped with cotton.

Thiol ointment is an irritant to the skin, and its occasional discontinuance is advised.

In moist eczema, scrofulosis of the skin, and in syphilides thiol has been used with advantage. In cases of moist eczema the skin is first washed with an antiseptic solution and thiol is then dusted on in the form of powder.

Thiol has been found very useful in the treatment of burns, where it acts as a desiccant, relieves the pain, hardens the skin, and hinders the growth of micro-organisms if any be present. (Bidder.)

In eczema, erythema, erysipelas, and lupus a 10-per-cent. ointment is advised (liquid thiol, 1 part; vaselin, 2 parts; lanolin, 7 parts; mix).

THORAX AND NECK, INJURIES OF.

See WOUNDS AND INJURIES OF THE CHEST.

THYMOL.—Thymol, U. S. P. (Thymecampbor; thymic acid; methyl-normal-propyl-phenol), is a phenol from the volatile oil of *Thymus vulgaris*, L., a garden-herb indigenous to Europe, but cultivated elsewhere. Thymol occurs in colorless, translucent crystals, having a

thyme-like odor, and a pungent, somewhat caustic taste. It is soluble in alcohol, ether, chloroform, carbon disulphide, glacial acetic acid, and oils, and in 1200 parts of water.

The oil of thyme (*oleum thymi*, U. S. P.), often misnamed oil of *origanum*, is a volatile oil which is soluble in alcohol, ether, chloroform, and in carbon disulphide, and possesses antiseptic and stimulating properties; it is principally used externally.

Preparations and Doses.—*Oleum thymi* (U. S. P.), 3 to 15 minims.

Thymol (U. S. P.), 1 to 10 grains.

Physiological Action.—Thymol paralyzes the terminal sensory nerves of the skin and mucous membranes, but is a local irritant. When given internally in doses of 20 to 30 grains, *per diem*, it causes a sensation of epigastric heat, associated sometimes with nausea and vomiting, but more generally with abundant diaphoresis, tinnitus aurium, deafness, a feeling of constriction in the forehead, a lowering of the temperature, and frequently diarrhœa. The urine is increased in quantity and becomes olive- or dark- green in color, yellowish brown by transmitted light, and free from albumin; on the addition of the tincture of the chloride of iron it becomes cloudy and grayish white in color. Violent delirium has occurred several times, marked collapse, and in one case (typhoid fever) unconsciousness with alarming collapse. The continuous use of thymol in small doses appears to interfere in some way with nutrition, so that emaciation results. Küssner has found that thymol has the power of dissolving the red blood-corpuscles. Thymol is excreted by the kidneys partly as thymol, partly as thymo-hydrochinon united with sulphuric acid, and partly as chromogen, which is probably an oxi-

dation product of thymol, and partly as some acid of unknown constitution (F. Blum, *Deut. med. Woch.*, xvii, '91).

Thymol lowers arterial tension and reflex action, reduces the temperature, and may cause fatal coma. The nerve-centres of the cord are paralyzed by large doses.

Poisoning by Thymol.—The poisonous properties of thymol have been demonstrated by the experiments of B. Küssner, who found that when given to dogs and rabbits by the stomach the poison acts very slowly and feebly, by reason of its slow absorption, but that when injected into the circulation it produces death by respiratory paralysis. Coma is developed some time before death, and the blood-pressure, which at first was maintained, now falls steadily.

The treatment of poisoning by thymol consists in the use of emetics or the stomach-siphon to evacuate the stomach and the employment of respiratory stimulants.

Therapeutics.—Thymol has been used as an antiseptic, anthelmintic, and antipyretic. The last use is condemned by H. C. Wood and others on account of its poisonous properties. Bälz concludes that thymol is much less certain and more dangerous as an antipyretic than is salicylic acid.

Martine commends this drug as an antiseptic sedative in typhoid fever, intestinal catarrh; etc., 30 grains being administered during the twenty-four hours. This use of thymol is indorsed by F. P. Henry, of Philadelphia. Gros commends it internally in diphtheria. Küssner has used thymol (3 to 5 minims of a 1-per-cent. solution three times a day) with advantage in diabetes, vesical catarrh, and in infantile diarrhœa, and has found that inhalations (1 to 1000) diminish the fever and expectoration in phthisis.

Campi has used thymol with success as a tæniacide. Five to 6 drachms of castor-oil are given at bed-time, and the next morning, beginning early, 10 grains of thymol are given every fifteen minutes for 12 doses, and 20 minutes after the last dose of thymol another dose of castor-oil. Sonsino, of Pisa, has had no results from it as a tæniacide, but has found it useful in cases of ascarides and especially *Oxyuris vermicularis*, in which last case he administered it by enema.

Externally thymol has been used as an antiseptic dressing. It has been found to be an excellent application in eczema, psoriasis, pityriasis, and ringworm. A 2-per-cent. ointment is of service in acne and alopecia circumscripta. The addition of a small portion of alcohol facilitates the preparation of a 1 to 1000 watery solution, which is sufficiently strong and sometimes needs further dilution.

In leucorrhœa a thymol solution has been found useful as an injection (1-3000 to 1-1000).

In catarrh of the upper air-passages C. C. Rice, of New York, recommends inhalations of the following:—

R Menthol,
Thymol,
Carbolic acid, of each, 5 grains.
Oil of eucalyptus, 2 ounces.
Oil of pine-needles (*pinus Sylvestris*), 3 ounces.—M.

A teaspoonful is added to boiling water and the steam inhaled, or 20 to 30 drops are placed upon a sponge or piece of cotton and held to the nose.

For use as a mouth-wash, a solution (1 per cent.) of thymol in glycerin may be employed. Thymol-soap (2 per cent.) is recommended as an antiseptic cleanser.

An infusion of thyme is of service in whooping-cough; it alleviates the

spasms, and is said to shorten the duration of the disease.

Oil of thyme may be employed as an internal remedy in cases of collapse, in bronchial affections, catarrh, and colic; externally it is useful in pruritus, weeping forms of eczema (to lessen the discharge), and as a pleasant, fragrant antiseptic for the bath.

THYMACETIN is a derivative of thymol, and is closely allied to phenacetin. It occurs as a white, crystalline powder, soluble in alcohol and ether and very slightly soluble in water. It has the same relation to thymol that phenacetin has to phenol. Solly recommends it as a valuable analgesic in headache and neuralgia, and as an hypnotic in insomnia and delirium. The dose is from 5 to 15 grains, best given in capsule.

THYROID GLAND, DISEASES OF.

Thyroiditis.—Inflammation of the thyroid gland either when organically in its normal state or when goitrous.

SYMPTOMS.—Inflammation of the thyroid is attended, as in the case of other tissues, by local pain and swelling, sometimes followed by suppuration in one or both lobes. The febrile symptoms may be quite marked and attended by severe cephalalgia and vertigo. The enlarged gland compresses the neighboring vessels, producing cyanosis, and, as a result of the secondary vascular engorgement, epistaxis. When an abscess is formed, it usually tends to break through the adjacent soft tissues, but not always through the skin. The trachea and œsophagus are therefore the seat of the purulent flow when rupture occurs. Metastatic abscess may also appear in the cervical cellular tissue. When spontaneous rupture occurs through the skin, or when the abscess is surgically evacuated the inflammatory process recedes.

When, however, it is left to itself, the purulent infiltration of surrounding parts may give rise to serious complications.

ETIOLOGY.—Thyroiditis occasionally occurs as an idiopathic disease, but, as a rule, it is due to the invasion into the glandular tissues of infectious germs during febrile disorders, especially typhoid fever and variola. Arthritism and the malarial toxæmia are thought to predispose to it, while uterine, menstrual, and climacteric disorders tend to cause congestion which, often repeated, may give rise to active inflammation.

TREATMENT.—Besides the antiphlogistic measures adopted from the start, of which lead-water and laudanum, ice-bags, or compresses, etc., are probably the best, the case should be carefully watched lest symptoms of pressure upon important vessels imperil the patient's life. Low tracheotomy (without general anæsthesia) is sometimes suddenly necessary. When an abscess is formed, it should be evacuated as soon as fluctuation is detected.

Thyroid Fever.—This is a febrile disorder which occurs in cases of partial thyroidectomy. Bérard, who observed it in 60 per cent. of the latter, and in 70 per cent. of cases of exothyropexy, states that the pulse and respiration are not accelerated in proportion to the rise of temperature. The patient complains of flashes of heat, sweats abundantly, and sometimes has tremor and shows considerable excitement; there may be patches of cutaneous hyperæmia due to vasodilatation; the tongue remains moist and rosy, the digestive functions are unaffected save at the period of decline, when diarrhœa is not uncommon; the heart-sounds are regular and sharp, and nothing abnormal is detected on auscultation of the lungs. If the wound is un-

covered at the end of two or three days, the deep parts of the dressing, around the drainage-tubes, are found to be moistened with a clear, odorless serum, and the skin in the neighborhood of the sutures is neither inflamed, hot, nor oedematous. Usually the more abundant is the serous flow, the higher the temperature.

Tumors of the Thyroid.—Roger Williams, in an analysis of the primary tumors under treatment at four large metropolitan hospitals during a period of from ten to fifteen years, found that of 7294 cancers only 7 originated in the thyroid, and of 1266 sarcomas only 1 started in this situation. A careful search in literature by Tippieny and Lanier enabled them to find records of only 16 cases of sarcoma of the thyroid. Of these 4 were doubtful. It appears generally to occur in patients well above forty years of age. Usually the growth is spindle-celled, but may be round-celled or mixed. Not one of the cases in the tables of these writers survived the operation, undertaken usually for the relief of dyspnœa, for more than a few days. (Firth, *Lancet*, Aug. 26, '99.)

(See also GOITRE, EXOPHTHALMIC GOITRE, INFANTILE MYXŒDEMA, and MYXŒDEMA.)

TONGUE, DISEASES OF.

Tongue-tie, or Ankyloglossia.—The condition known as tongue-tie is due to an abnormally short frænum linguæ. To this condition was formerly attributed many of the disorders of infancy, and section of the frænum was frequently resorted to. Although it is frequently restricted in length, it is only when it is bound down so as to cause it to be held behind the incisors that a short frænum can prevent suckling or interfere with articulation. Undue

elongation of the frænum may produce similar symptoms, especially when its upper insertion is unusually near the tip.

TREATMENT.—Although section of the frænum is an operation presenting no difficulty, it may become dangerous if the presence of the ranine arteries is not borne in mind, fatal hæmorrhage having occurred. The tissues should therefore be carefully examined and the portion cut should be isolated from any vessel that may be encountered. Blunt-pointed scissors are usually employed, after anæsthetizing the parts with a 10-per-cent. solution of cocaine, applied with a camel's-hair pencil. The mouth should be kept scrupulously clean.

Section of the frænum should be extremely limited in its application; it is warranted, for example, when there exists an ankyloglossia, congenital or acquired, immobilizing the tongue more or less in a part of the mouth. This may be total or partial. When the frænum is excessively long, reaching sometimes to the point of the tongue and impeding its movements, simple section is not sufficient; excision must be resorted to. It is wrong to think the operation is always indispensable if the child nurses badly. A few exercises in suction on the finger may correct this defect without any operative intervention. In all cases excision of the frænum is absolutely useless for correcting faults of pronunciation. These are amenable only to a methodical, natural, and rational education of the organs of speech, the duration of which need not exceed three weeks. Chervin (*Revue Inter. de Med. et de Chir.*, Sept. 10, '94).

Lingual Papillitis.—This is a form of glossitis often met with in gastric disorders, localized in the papillæ of the tongue, and described by Cotard. Its only symptom is a burning or lancinating pain on the anterior two-thirds of the tongue, with greater intensity on its tip and borders. The pain, often recurring at intervals in the form of neuralgic at-

tacks, is aggravated by the ingestion of food,—solid or liquid, with the exception of milk. No other trouble, either of general and special sensibility or of the salivary secretion, is observable. Examination with the naked eye does not reveal any remarkable alteration, but examination with the magnifying-glass shows, in several places, and chiefly on the borders and tip of the tongue, some little red points, ulcerated and very painful when touched, whose number is greater in proportion as the pain is more violent. The seat of this lesion is evidently in the nervous terminations in the lingual mucous membrane, or, more exactly, in filiform papillæ.

The best treatment is galvanic cauterization (with the aid of the magnifying-glass) of the ulcerated points, a few points being touched at each sitting (Duplaix).

Glossitis.—Inflammation of the tongue is usually due to traumatism. It may be caused by hardly-perceptible injuries inflicted during mastication, or to more evident factors: carious teeth, scalds, bites, incised or punctured wounds, laceration, etc. It is quite probable that inflammation of the tongue never occurs without the introduction in its parenchyma of some pyogenic organism.

SYMPTOMS.—The first symptom is tumefaction of the organ, which is sometimes so great as to cause it to protrude from the mouth. Severe pain is usually present and deglutition is seriously impeded through the marked sensitiveness of the organ. When the swelling involves the lymphatic elements in the posterior portion of the tongue, dyspnœa may appear, owing to the pressure upon the epiglottis. Stomatitis is usually present and pyalism is more or less marked. The breath is usually fœtid, a feature due to a thick, yellowish coating on the

lingual surface, which may also present striæ of ulceration. There is usually considerable fever. The symptoms generally become aggravated up to the third or fourth day, when there is a lull, followed by gradual improvement. Occasionally an abscess forms deep in the organ and occasionally close to the periphery. In the latter case it is quickly relieved by incision, which soon reduces the glossitis. Gangrene sometimes occurs. In rare cases one side only is involved in the inflammatory process.

TREATMENT.—The tendency of the patient to expose his tongue to the air tends to increase the trouble by allowing desiccation of the surface. While he should be fully permitted to continue this practice, because it affords relief in various ways, the tongue should be kept moist and clean, by means of a mucilaginous solution containing 10 grains of boric acid to the ounce. This can best be done by the patient himself with a cotton swab. When he can close his mouth small pieces of cracked ice are grateful, and the solution mentioned should be used as a mouth-wash several times an hour. When there is great infiltration, scarifications with a thin knife (under antiseptic precautions) afford marked relief if a couple of ounces at least of blood are drawn. Severe pain may be counteracted by painting the organ once in awhile with a 4-per-cent. solution of cocaine. When the ingestion of food becomes difficult a catheter introduced on the side of the tongue into the pyriform sinus—*i.e.*, alongside the larynx—can adequately serve for the administration of liquid food. This manœuvre is given in detail under **ESOPHAGUS** (volume v), in the treatment of cancer of that canal. Rectal alimentation is sometimes necessary. Tracheotomy is occasionally demanded to avoid

asphyxia. Saline purges early in the case tend to shorten the duration of the lingual inflammation.

Chronic Glossitis.—This condition, in many cases, is attributed to syphilis, when in truth it is but the result of tobacco irritation, or, as shown by Brocq, to gastric affections in rheumatic subjects. Strong alcoholic drinks occasionally represent the primary source.

SYMPTOMS.—The tongue is red and sensitive, especially near the edges, and oval grayish patches resembling those of syphilis replace papillæ or epithelial cells, which have yielded to the superficial ulcerative process. The resemblance to syphilis is further supported by deep furrows, which tend to separate the tongue into island-like, lobulated surfaces. A foul breath is often present, especially when the condition occurs in drunkards. The history of the case and the results of treatment alone facilitate the recognition of the true disorder present.

TREATMENT.—Correction of dietetic errors are of prime importance. If syphilis is suspected, a course of iodide of potassium with the copious use of water simultaneously will do no harm if no luetic trouble is present. Applications to the furrows of a nitrate-of-silver solution, 20 grains to the ounce, with a camel's-hair pencil (never the solid stick) soon improves them. The oral cavity should be kept scrupulously clean, and washed out three times daily with a saturated solution (one drachm to the pint) of chlorate of potassium.

Literature of '97-'98-'99.

Studies of acute abscesses of the tongue showing that cases of suppurative glossitis may be divided into two groups: (a) circumscribed abscesses; (b) suppurative and generalized glossitis of the interior half. Lingual abscess

is rare, and may be caused by traumatism, scratches, etc., or occur idiopathically. The prognosis is favorable. The diagnosis is generally easy, although it may be confounded with cyst or syphilitic gumma. Morisot (*Revue Heb. de Laryn.*; *Amer. Medico-Surg. Bull.*, Dec. 10, '98).

Leukoplakia.—This oral disorder is assimilated by various authors to psoriasis, herpes zoster, etc. While it may affect the entire mouth, it is usually most marked on the tongue, and consists of whitish, opaline patches of cicatricial aspect, which tend to disappear spontaneously and to reappear. It gives rise to no distressing symptoms other than slight pain at the seat of the lesions, which are, in reality, narrow, minute ulcers.

Leukoplakia occupies an important position in diseases of the tongue, since it is thought by many authorities to be a frequent precursor to epitheliomatous cancer of that organ.

Two hundred and forty cases of leukoplakia studied. Lesions believed to be, as a rule, epithelial thickening, resulting from mucous patches. Only two cases were in women, both syphilitic. Four grades of the affection are recognized: 1. Very slight changes at the corner of the mouth, generally unilateral; a dull, dry appearance, with slight epithelial thickening. 2. Appearances more marked, thickening greater, white coloration. Similar small patches on mucous membrane of cheek, lips, and tongue. 3. More extensive patches, with intense white enamel-like appearance, on angle of mouth, in cheeks and lips. The tongue shows everywhere white opaline spots, and often small cracks; thin, minute, painful ulcers, which come and go. 4. Changes most marked in the tongue. The whole upper surface is smooth, shining, enameled in spots, the papillæ gone. In the largest proportion of cases the angle of the mouth, alone or together with some other part, was affected; the tongue alone in nine cases, the lips alone in three. In about 80 per

cent. of the cases there was a clear history of syphilis. In many of the other cases there was a strong suspicion of such infection. In four or five cases antisyphilitic treatment either cured or much improved the condition. Of 148 cases questioned as to tobacco-smoking, 47 smoked little or not at all, 101 moderately, and 2 excessively. Syphilis alone occurred in 36 of these cases, smoking alone in 37, syphilis and smoking in 64, and neither in 11. W. Erb (*Münch. med. Woch.*, Oct. 18, '92).

TREATMENT.—As a local application for leukoplakia, Rosenberg uses iodide of potassium in a 20-per-cent. solution painted on the affected points. With this treatment leukoplakia has disappeared in a few days, after lasting for seven years and resisting all usual methods.

The following paste, applied with a swab, is recommended by Leistikow, in leukoplakia:—

R Terræ siliceæ, 24 grains.
Resorcini, 48 grains.
Adipis, 8 grains.—M.

After eight to fourteen days a shriveling is noticed, when the slightly inflamed mucous membrane can be brought to a normal condition by balsam of Peru.

According to Perrin, the only treatment for leukoplakia is the complete extirpation of the spots by surgical means. It is the only way to avoid the final evolution of this disease into true epithelioma. Solid nitrate of silver should never be used.

Ulceration of the Tongue.—The tongue frequently becomes the seat of ulcers, benign and malignant, and the recognition of their true identity is frequently of unusual importance. Lingual ulcers may be divided into four classes: simple ulcers, generally due to disorders of digestion; those occurring as a manifestation of syphilis; those due to tuber-

culosis or lupus; and finally those attending cancer.

SIMPLE ULCER.—This usually occurs around the edge of the tongue, and its border may be tumefied and raised as is the case in epithelioma. In the neighborhood, however, may often be found a carious tooth, or the lesion may be traced to some other form of traumatism. While there is swelling around the base, it is limited in extent and there is no induration such as characterizes cancer. Upon removal of the cause, or under simple remedial measures (see GLOS-SITIS), it soon disappears.

SYPHILITIC ULCER.—Syphilitic ulcers are usually preceded by an induration; in cancer this induration almost always appears after the ulcerative process has begun. The ulcer in syphilis is usually located near the tip; a cancerous ulcer is on the side. There are usually two or more gummata; cancerous ulceration is always single. The tongue is often furrowed and fissured in syphilis; such is never the case in cancer. There is often a history of syphilis, and test treatment of this condition soon establishes the diagnosis.

TUBERCULOUS ULCER.—A tuberculous ulcer is single, as in cancer, but there is no induration; though it may, by its color, resemble a gumma, it is often yellow. Examined closely, the bottom of the ulcer may be seen to present minute, yellowish dots, even if the ulcer is grayish white; this is the main habitat of tubercle bacilli, which can often be detected in scrapings. Tubercular ulcers sometimes heal, leaving a scar; a cancerous ulcer spreads steadily. A tuberculous ulcer usually occurs as an accompaniment of tuberculosis in another region, especially the larynx. Lupus rarely, if ever, attacks the tongue primarily.

CANCEROUS ULCER.—The ulcer attending cancer, besides the features already noted, is ragged and everted, progresses irregularly in various directions, and presents an angry-looking appearance. It soon becomes fungous and granular, is covered with an ichorous, fœtid liquid, and bleeds upon the least contact: a condition witnessed in no other variety of ulcer. Again, the neighboring glands soon become enlarged: the only condition in which this occurs in lupus, which seldom if ever attacks the tongue primarily. The age of the patient, beyond forty years, at which cancer occurs is seldom, if ever, that after which lupus is observed.

Precancerous conditions, which at the outset may appear benign, have grafted upon them a cancerous condition; therefore no surgical lesion of the tongue, unless it be of a merely transitory nature, must be regarded as unimportant. In every sore of doubtful character a portion of the diseased tissue should be excised and examined under the microscope. The piece should not be a mere fragment snipped off with the scissors. Cocaine should be injected and a substantial piece of tissue, including the substance of the sore and a little margin, should be removed. The sections for examination should be cut at right angles to the surface of the sore. Anderson (*Quarterly Med. Jour.*, Jan., '95).

Tumors of the Tongue.

The relative frequency of tumors of the tongue was well illustrated by statistics based upon 13,824 neoplasms treated in two London hospitals during a prolonged period. An analysis of these cases by Roger Williams showed that out of this number 880, or 6.3 per cent., originated in the tongue. As regards the varieties observed in this organ, 804 out of the total number were epitheliomata (91.3 per cent.), while the remaining forms consisted of sarcomata, papil-

lomata, cystomata, fibromata, adenomata, angiomatica, and one myxoma.

Cancer of the Tongue.

As just stated, the variety invariably met with in the tongue is epithelioma.

Symptoms.—The symptoms depend upon the location of the initial lesion. When it begins far back in the mouth, the submaxillary or posterior sublingual regions become sensitive, and darting pains reaching the ear are complained of. If the region be palpated, lobular, movable, hard swellings may perhaps be felt: glands which are infiltrated. Deglutition soon becomes somewhat impaired, and the tongue is moved with difficulty during articulation. The submaxillary glands have, by this time, probably become fixed and enlarged in size and the disease progresses rapidly. Profuse ptialism is soon followed by the expectoration of foul pus, often tinged with blood, all evidences that the stage of ulceration has begun. This involves the danger of death from hæmorrhage, owing to the proximity of the growth to large vessels.

When the growth starts anteriorly, the process may be followed with more precision. A small slit or crease, a minute hypertrophied papilla, or a small warty projection may prove to be the primary focus. The crown of this soon becomes ulcerated and covered with thin scabs, which the patient removes as fast as formed, leaving a bleeding surface. Then gradually develops the typical epitheliomatous ulcer with ragged edges, and a hard, broad, infiltrated base and fungous outgrowths filled with foetid pus, which gives the breath a repulsive odor. As the neoplasm spreads, the suffering of the patient gradually becomes more acute, the tongue is immovable, the submaxillary markedly enlarged, and he gradually sinks as a result of starva-

tion and exhaustion, if hæmorrhage does not bring on sudden death. When the growth begins anteriorly, the lymphatics are not involved as early, and the chances for a successful operation are consequently greater.

[The lymphatics from the anterior portion of the tongue, from the lips, and adjoining parts of the mouth pass to the lymph-glands under the lower jaw, in contact with the submaxillary; thence the current traverses the superficial cervical lying beside the sterno-mastoid; from these, to the deep cervical in contact with the large blood-vessels. Hence, in epithelioma primarily attacking the parts here indicated, we always find these three sets of lymph-glands enlarge successively.

On the other hand, the lymph-current from the root of the tongue and from the pharynx passes mainly to the deep cervical glands; a portion from the surface tissue also to the superficial cervical. Epithelioma, commencing here, accordingly implicates secondarily these two sets, sometimes only the deep. The submaxillary lymph-glands now always escape infection,—that is, until a very late stage,—and those at the edge of the sterno-mastoid may do so. RUDOLPH MATAS, Assoc. Ed., Annual, '93.]

Etiology.—Cancer of the tongue is comparatively rare among women, being about 16 per cent. of reported cases. This is, to a certain degree, accounted for by the causative factors, the principal ones of which are: smoking, jagged teeth, the scars of syphilis, alcoholic drinks, the pressure of a pipe-stem on one spot, a traumatism; various disorders of the tongue, especially leukoplakia, etc.; in fact, any condition which tends to cause irritation of any one part of the organ. A condition of the surface of the tongue called "leucoma" by Hutchinson, a form of chronic glossitis, appears as a primary cause in 16 out of 80 cases analyzed by Butlin. The promiscuous application of solid nitrate

of silver or any kind of caustic is also thought to be another prolific source.

No clear line, either clinically or histologically, can be drawn marking the transformation of a simple into a cancerous condition; so that any apparently-simple lesion of the tongue, which does not yield to treatment after every source of irritation has been removed, should be excised at once, even in the absence of definite signs of cancer. E. W. Stevens (Phila. Polyclinic, July 14, '94).

The age at which epithelioma of the tongue appears corresponds to that of cancer in other parts of the organism, namely: after 45 years. Occasionally, however, it occurs earlier. According to Warrington Howard (*Lancet*, Mar. 2, '95), a larger proportion of the cases found to be under 30 occur in women. Hereditary predisposition may be traced in many cases.

Prognosis.—Left to itself, lingual epithelioma steadily progresses, and death occurs in from eighteen months to two years after the character of the neoplasm has been recognized. In a series of 69 cases treated by Sachs the average time elapsed between the onset of the growth and the time the cases presented themselves for treatment was five months. It is probable, therefore, that two years represent the average duration of life from the start of the initial lesion. The prognosis is also greatly influenced by the thoroughness of the operation performed; the more radical this is, the better are the chances, especially if neighboring glands are involved. An early involvement of the glands is an unfavorable sign, particularly when the cervical glands behind the angle of the jaw are affected. An operation, if performed when the case is not too far advanced, invariably prolongs life even in cases of recurrence. This is especially evident in private cases.

Literature of '97-'98-'99.

Study of 102 cases of operation for cancer of the tongue in which primary operation was performed. Nearly an equal number was operated upon in hospital and private practice. After getting returns from all but 7 cases, it was found that, besides the fact that the mortality was greater immediately subsequent to the operation in the hospital cases, the number of absolute cures with freedom from return, in some cases for thirteen years, and in all for over three years, was much greater in the private than in the hospital cases. Number of deaths due to operation in hospital group is 9, while only 1 of private patients in whom there was marked involvement lost. Number of such patients alive and free from disease more than three years after operation, or who died from other causes after the extirpation of three years, was 7 in hospital group and 13 in other group, and there are 9 others free from return after one year, but not over three years, while there are only 2 hospital patients who may prove cures. Percentage of cures in hospital group of cases at best is 16, while private cases is 26, with a chance of its being much greater.

The reason for the difference in results is that the private patients are better educated and come for operation much earlier than do the others, which illustrates great advantage for early operation. Cases which may be claimed as cured show that the disease, in the large majority of them, was situated in the anterior two-thirds of the tongue. But even some of the worst cases may be cured if the disease has not invaded the tonsillar and neighboring regions. Among private patients cured there was not one in whom the glands were removed, while, in the hospital cases, of the 7, 5 had the glands removed at the time of the operation or immediately subsequent to it by a second operation, and in 4 or 5 they were not only enlarged, but proved by microscopical examination to be cavernous. The whole tongue was removed in only 1 of the successful cases. Butlin (*Brit. Med. Jour.*, Feb. 26, '98).

Treatment.—According to Butlin, whose results have been, when compared with those of many other operators, most satisfactory, removal of the entire tongue is not essential to a successful operation. With the cancer, he removes three-fourths of an inch of apparently healthy tissue around it in every direction. When the disease is on the border of the tongue, half the tongue to an inch behind the margin of the disease, is excised. In cases in which the disease is near the tip or forepart of the dorsum, the forepart of the tongue is removed. During recent years this surgeon has resorted to the following operation, in which the entire contents of anterior triangle of the neck is removed: A very careful dissection of the triangle is made, so that the connective tissue and glands are all taken out in one continuous mass. Search is made between the muscles in front for one or two deeper-seated lymphatic glands, and the glands in front of the parotid gland and about the angle of the jaw are taken out with the contents of the triangle. The submental and parotid glands are not so easily and certainly removed *en masse* in this operation as the submaxillary and carotid groups. This is done at a second operation, and not at the time of the excision of the tongue.

Literature of '97-'98-'99.

Out of 61 operations personally performed for malignant disease of the tongue, none died from the effects of the operation save 1, a male on whom Kocher's method modified was used; he died of asthenia. Of the 61 cases, in 29 the disease returned. Many of these operations were performed, not with a view to cure, but merely to relieve and remove a foul, sloughing, fætid mass, and thus render existence more tolerable. Twenty-two cases were not traced directly, but it was learned indirectly that

5 were healthy three or four years after operation. Seven others had had no return of the disease, to personal knowledge, one to fifteen years after operation, while 3 had no return seven, three, and two months after operation. It is expedient to ligate the external carotid before removing the tongue, tonsils, and part of the palate; but preliminary ligation of the lingual arteries in excision of the tongue, as recommended by Mirault, is not required; there is no hæmorrhage from the ranine arteries to cause alarm; it is good surgery to remove the tongue first and then the diseased glands later, if it is necessary to do the operation in two stages.

Thermocautery-scissors preferred when suitable. The tongue is held by toothed forceps, and just as the ranine arteries are about to be severed the hot blade is allowed to cool a little, in order to allow the arteries to bleed; they are then secured and ligated. Frequent sprays are the best antiseptics. Wheeler (Dublin Jour. Med. Sci., Apr., '97).

The salivary glands may become infected by direct invasion from contiguous lymphatic vessels or glands, and they may become infected by the bloodstream. In lingual cancer the glands should be looked upon as infected and completely cleared out. The submaxillary, submental, and deep cervical glands on both sides should be removed, and even clearing out should be extended to the clavicle. If enlarged glands can be felt in the supraclavicular fossa, they should be removed.

Following incisions recommended: A median cut running from the chin to the sternum, and a somewhat concave incision running from the angle of one jaw across the hyoid bone to the angle of the jaw on the opposite side. The four flaps thus formed can be turned backward. H. Kuttner (Beiträge z. klin. Chir., B. 21, H. 3, '98).

Walter Whitehead, after an experience obtained in a large number of cases, recommends the following procedure: The patient is placed completely under the influence of the anæsthetic during the first stage of the operation, but after-

ward only partial insensibility is maintained; the mouth is securely gagged and kept fully open throughout the operation; the head is supported in such a position, that while the best light is secured, the blood tends to gravitate out of the mouth rather than backward into the pharynx; a firm ligature is passed through the tip of the tongue for the purpose of traction. The first step in the operation consists in dividing the reflection of mucous membrane between the tongue and the jaw and the anterior pillars of the fauces. Rapid separation of the anterior portion of the tongue from the floor of the mouth is then made. If possible, the lingual arteries should be secured with Spencer Wells's forceps prior to division. A ligature is passed through the glosso-epiglottidean fold before finally separating the tongue. A mercurial solution should be applied to the floor of the mouth, and the surface painted with an iodoform styptic varnish.

[In such operations the heat of the mouth tends to promote the development of infectious elements and fermentation, causing fœtor. Puzey, in two cases, was able to thoroughly prevent the latter by hourly painting the whole wound with glycerin and borax. RUDOLPH MATAS, Assoc. Ed., Annual, '96.]

Hæmorrhage is one of the most important dangers encountered during amputation of the tongue and subsequently. Secondary hæmorrhage is especially liable to occur when the wire or galvanocautery *écraseur* is used, at the time the slough becomes separated. Whitehead's operation described above is done with scissors after the lingual artery has been ligated. But if this should give way, the following procedure recommended by Mr. Heath arrests the bleeding: The forefinger passed well down beyond the epiglottis is made to

hook forward the hyoid bone and drag it up as far as practicable toward the symphysis menti. The effect of this is to stretch the lingual arteries so as to completely control for a time the flow of blood through them.

Antisepsis of the mouth until healing is complete is an extremely important feature of surgical measures. It should be frequently washed out or painted with a strong solution of borax.

KOCHER'S OPERATION.—Another danger connected with excision of the tongue is septic pneumonia or bronchopneumonia, brought on through infection from the wound. This is prevented to a great degree by Kocher's method of excising the organ, the pharynx being plugged with carbolized sponges and iodoform gauze, after tracheotomy has been performed. The trachea is thus totally disconnected from the wound and no pus can enter it. The patient is fed by the rectum and by the mouth twice a day, when the oral dressing can be safely changed without involving infection for a few minutes. The operation itself is performed as follows: "An incision is made commencing a little below the tip of the ear and extending down the anterior border of the sterno-mastoid muscle to about its middle, then forward to the body of the hyoid bone and along the anterior belly of the digastric muscle to the jaw. The resulting flap is turned up on the cheek and the lingual artery is ligatured as it passes under the hypoglossus muscle. Commencing from behind, all the structures in the submaxillary fossa are removed, viz.: the lymphatic glands, the maxillary, and if necessary, the sublingual glands. The opposite artery is now tied by a separate incision if the whole tongue is to be removed. The mucous membrane along the jaw and the mylohyoid muscle are

then divided and the tongue drawn out through the incision and removed with scissors or galvanocautery."

AFTER-TREATMENT.—More than ordinary attention must be given to this feature of the operation. We have seen the dangers accruing from the gravitation of pus into the bronchi, septic infection from the wound, etc. Before, during, and after the operation the mouth should be kept as aseptic as possible by means of borax or permanganate-of-potassium solution, 20 grains to the ounce of the former, and 1 grain to the ounce of the latter. After the operation Whitehead washes the parts with a solution of perchloride of mercury, dries it thoroughly, then applies an antiseptic varnish composed of the ingredients of Friar's balsam, but substituting a saturated solution of iodoform in ether. This he found to be more comfortable to the patient than gauze or lint. Some surgeons prefer to pack the cavity with moist iodoform gauze—made with glycerin and rosin dissolved in alcohol. Mansell-Moullin cuts this into strips, packs the whole cavity with these, laying them flat one upon the other with fresh iodoform between until the wound is filled. The deeper layers adhere to the raw surface, from which they cannot be separated until it has begun to granulate; the superficial ones sodden with saliva may be removed from time to time. At the end of a few days the whole comes away itself, leaving a healing surface beneath.

The patient should at first be fed by the rectum. After three or four days a catheter or soft tube may be introduced into the pyriform sinus on either side of the larynx, and the patient may be fed through it. As soon as the patient is able to sit up, the second or third day, he should, as much as possible, hold his

head forward and downward so as to prevent gravitation of the discharges into the pharynx and œsophagus.

Sarcoma.—The number of recorded cases of sarcoma of the tongue, according to Georges Marion (*Rev. de Chir.*, Aug., '97), is limited to 24; it may occur at any age, but in one-half of the cases it occurs before the thirtieth year. It is as common in the female as in the male. The tumor may be composed of round or spindle cells or of a mixture of these. It may be seated in the substance of the tongue or be pedunculated. The symptoms are chiefly the result of its situation or volume. They offer nothing characteristic of the neoplasm. The secondary swelling of the glands seems to occur very late. A positive diagnosis of lingual sarcoma can hardly be obtained except by "test-excision" and careful microscopical examination of the excised pieces. The differential diagnosis between sarcoma and gumma is frequently impossible, even by microscopical examination of excised fragments; in such cases an energetic syphilitic treatment is first indicated. Neither hæmorrhage nor pain are frequent. The enlargement of glands which may accompany the affection is either inflammatory or an evidence of generalization. Although the progress of the disease is rapid, the prognosis is relatively favorable, for recovery may be expected in one-half of the cases.

The operative treatment consists in the removal of the tumor, with a sufficient margin of healthy tissue surrounding it.

Injuries of the Tongue.

Injuries of the tongue are seldom dangerous, though profuse bleeding sometimes ensues. The organ is frequently bitten during falls, trismus, an epileptic attack, etc., and occasionally completely severed. Injuries of external

source are infrequent, owing to the protected position the organ occupies. Foreign bodies are occasionally introduced, and remain in the lingual tissues, giving rise subsequently to an enlargement suggesting a growth.

Case in which a tooth lodged in the base of the tongue for several years and simulated carcinoma. Sanford (*Jour. of Laryn.*, July, '91).

Case in which a fragment of a pipe was retained for five years in the tongue. Delassus (*Jour. des Sci. Méd. de Lille*, May 29, '91).

Foreign bodies in the tongue may give rise to the appearance of serious troubles. In personal case, a man of 55 presented lesion of tongue. The lateral situation, size, and hardness of lesion; absence of functional phenomena; and suspicious antecedents, all pointed to syphilitic neoplasm. A piece of pipe, 2½ centimetres long and 1 centimetre wide, was extracted. Derville (*Jour. des Sci. Méd. de Lille*, June 29, '95).

TREATMENT.—In slight or moderate traumatism the use of ice, compression, etc., soon arrests the flow. If this does not succeed, the solution of perchloride of iron or the cautery may be tried. Profuse hæmorrhage requires ligation of the cut artery—probably the ranine, easily found usually by raising the tongue. Approximation with sutures sometimes suffices even when the hæmorrhage is quite severe, but it is usually easier to find and tie the main bleeding-vessel. Sutures should be tied with unusual care, to avoid undoing the knots by the movements of the tongue. Loose pieces heal quickly when carefully adjusted. While the wound is healing, the mouth should be kept as nearly aseptic as possible, by means of a borate-of-sodium wash (10 grains to the ounce of water) frequently employed.

CHARLES E. DE M. SAJOUS,
Philadelphia.

TONSILS AND PHARYNX, DISEASES OF.

Acute Tonsillitis.

Acute tonsillitis, inflammation of the tonsils and adjacent structures, may be phlegmonous or croupous.

Symptoms.—Phlegmonous (or follicular) tonsillitis is ushered in by a feeling of dryness and stiffness in the throat, soon followed by dysphagia. There may be a chill, or chilly sensations, and pain in the legs and back, headache, and fever, which during the height of the disease may reach 106°. As the inflammation progresses, the sufferings of the patient become severe, the dryness of the throat causes frequent attempts at swallowing saliva, which are exceedingly painful. In the phlegmonous variety the mouth can be opened only with pain and difficulty, and speech becomes almost unintelligible. The tongue is heavily coated and the breath fœtid. The hearing is frequently blunted from extension of the inflammatory process to the Eustachian tubes, and abscess of the ear sometimes results. Nasal breathing is at times entirely abolished. The fever, pain, and difficulty of swallowing become greater and greater, if an abscess is forming, and the relief is proportionately great after it has opened. As the patient expectorates the pus, he feels almost well, so great is the sense of relief, the fever and pain quickly subsiding together.

Etiology and Pathology.—An attack of phlegmonous tonsillitis is usually the result of exposure to cold and wet; but a person who has once had the affection is more liable to subsequent attacks. The rheumatic or gouty diathesis also plays its part in the production of attacks of acute tonsillitis. And this is also true of chronic inflammation of the crypts of the tonsils, with accumulation

of their secretions. It is by inoculation of the cellular tissue by such retained and decomposed masses that peritonsillar abscesses are caused, for abscess rarely occurs within the tonsil itself as the result of acute tonsillitis. Phlegmonous tonsillitis is a disease of adolescence and early adult life, and does not frequently attack individuals who are over thirty-five years of age.

In croupous tonsillitis the brunt of the inflammation is at first borne by the crypts of the tonsils, which pour out an abundant cheesy secretion, which, adhering to the surface of the tonsil, presents somewhat the appearance of a diphtheritic membrane.

Literature of '97-'98-'99.

Acute tonsillitis due to the infection of the streptococcus pyogenes and the staphylococcus pyogenes albus and aureus, is characterized histologically by a diffuse inflammation of the parenchyma of the organ, appearing in the form of an increased proliferation of lymphoid cells and of the endothelial cells of the reticulum, due probably to the absorption of a toxin formed in the crypts. While bacteria are rarely demonstrable in the tonsillar tissue in cases characterized by purely proliferative lesions, yet at times infection of the interior of the follicle occurs, giving rise to circumscribed supuration and the formation of abscesses which eventually discharge into the crypts. Goodale (Jour. Boston Soc. of Med. Sciences, Jan., '99).

Treatment.—A thorough application of a solution of nitrate of silver of the strength of 1 or 2 drachms to the fluid-ounce of water frequently aborts the attack, if applied early. The silver solution should be painted upon the tonsils and adjacent inflamed mucous membrane by means of a swab of cotton and in croupous tonsillitis carried into the crypts after washing them out with peroxide of hydrogen by means of a modified Blake

cannula. The relief experienced by the patient as the result of the application is almost instantaneous, and the application should be repeated once or twice a day until all inflammatory symptoms have subsided. The nares and pharynx should be washed by means of a spray from an atomizer containing Dobell's solution before making these applications, and a lozenge of guaiac and tannin may be prescribed for the patient's use in the intervals between the applications. It is best also to open the patient's bowels thoroughly at the commencement of an attack by means of small, frequently repeated doses of calomel. When these measures do not succeed in aborting the attack, but the fever and suffering of the patient are constantly increasing, aconite, in drop doses of the tincture every hour or every two hours, will give most excellent results.

Literature of '97-'98-'99.

In tonsillitis, with the frequent application of hydrogen dioxide to the ulcerated surface, general treatment may dissipate the attack. It is often advantageous to apply guaiacol, diluted one-half with glycerin, to the inflamed mucous membrane. This is especially true when the temperature is high. A 4-per-cent. solution of potassium bromide is also grateful as a gargle or spray to the inflamed throat, and a coarse spray of a 3-per-cent. solution of camphor-menthol affords relief. Patients derive much comfort from the following formula made into a small tablet:—

R Ammonii chloridi, 1 grain.
Tincturæ opii camphoratæ,
Syrupi scillæ compositi.
Syrupi Tolutani, of each, 5 minims.
Extracti glycyrrhizæ, 3 grains.

This tablet is allowed to dissolve slowly in the mouth. S. S. Bishop (Med. Fortnightly, Apr. 1, '99).

When pus has formed, the abscess should be opened by an incision through

the anterior pillar at the upper portion of the tonsil, the so-called point of election; or at any spot where the finger detects fluctuation. Even where no pus escapes from the incision, the bleeding affords a certain amount of relief, and may bring about resolution of the inflammation.

In suppurative peritonsillitis after a thorough application of cocaine a thick stiff probe should be passed into the supratonsillar fossa. A slight pressure outward and slightly upward often suffices to make a way through the softened wall of the abscess-cavity. If pus appears, a sinus forceps may be passed into the cavity and opened. It is well to repeat this latter procedure on two successive days; in this way the pus can be thoroughly evacuated. Killian (*Münch. med. Woch.*, July 28, '96).

Literature of '97-'98-'99.

In an attempt to abort peritonsillar abscess, a good dose of calomel is given, followed by a saline purge. The tonsil and surrounding pillars are painted thoroughly with a 60-grain solution of nitrate of silver, and this is repeated once daily. Hot gargles of vinegar and hot water, as hot as can be borne, should be begun early, and then hot fomentations applied externally. Salol and phenacetin always make the patient feel more comfortable. When abscess forms, it should be opened. Dunbar Roy (*Atlanta Med. and Surg. Jour.*, July, '98).

Hypertrophy.

There are two varieties of hypertrophy of the tonsils: the ordinary soft hypertrophy found in children and young adults, and the scirrhus, or hard, tonsil, which is characterized by an enormous increase of the connective tissue of the gland and a canalicularization of its blood-vessels.

Symptoms.—Generally there is more or less obstruction to breathing, the patient snoring during sleep. Articulation is impeded, and there may be some difficulty in swallowing, especially in the

cases of young children. The crypts of the tonsil may become filled with cheesy masses, which, undergoing putrefaction, impart to the breath an offensive odor. Hypertrophied tonsils also interfere sometimes with the proper performance of the functions of the Eustachian tubes, and thus become a cause of aural catarrh and deafness.

It is probable that the peculiar and complex innervation of the tonsil explains the occurrence of cough due to lesions of that body. Not only are hypertrophied tonsils responsible for the cough, but foreign bodies or calculi in the organ, lacunar tonsillitis, pharyngomycosis, or other affections are capable of being factors in its causation. The cough has certain definite characteristics: it is violent, abrupt, spasmodic—occasionally even agonizing; neighboring reflexes are excited, and particularly that concerned in the secretion of tears. The complete absence of expectoration leads to the conclusion that the affection is not due to pulmonary disease, and, further, if titillation of the tonsil with a blunt body induces the cough, while, on the other hand, the same operation, repeated after the organ has been carefully cocaineized, fails to do so it may safely be determined that the abnormal tonsil is the exciting cause. Furet (*Archives de Laryn.*, May-June, '96).

Treatment.—The best treatment is removal of the major portion of the hypertrophied gland either with the tonsillotome, galvanocautery-snare, or by galvanopuncture. Occasionally the operation with the tonsillotome is followed by dangerous hæmorrhage. Care should be taken not to wound the anterior pillar of the fauces, as it contains a small artery, which, when wounded, gives rise to troublesome bleeding. When the pillars are adherent to the tonsils, they should be carefully separated from the tonsil by means of a probe, before operating. A tonsil may be removed by means of the galvanocautery-snare al-

most as quickly and painlessly as with a tonsillotome and with little danger of hæmorrhage.

Scirrhus, or hard, tonsils should not be removed with the tonsillotome; owing to the hardness of the tissues surrounding the blood-vessels, a wounded artery cannot contract, and the hæmorrhage is usually long continued and may be profuse and alarming.

Literature of '97-'98-'99.

Tonsillectomy, by which is understood the careful dissecting away of the whole gland, is to be preferred to tonsillotomy, which as commonly performed by the tonsillotome amputates only a portion of the diseased gland.

The contrasting of these two operations shows a distinct advantage in favor of tonsillectomy, as it absolutely prevents recurrence of tonsillitis because of the removal of all of the diseased crypts with their contained bacteria. It liberates the pillars and restores the action of the soft palate, with a corresponding improvement of voice. If the operation is perfectly done, a smooth surface is left, a result not reached by tonsillotomy. It is the only practical method in those tonsils where the surface is so soft that a firm hold cannot be obtained by a tonsillotome. In more than three hundred personal cases no untoward results have been met, only one requiring attention on account of hæmorrhage. J. H. Coulter (Jour. Amer. Med. Assoc., Sept. 23, '99).

Should an artery be observed to spurt after an operation upon the tonsils, the bleeding-spot should be pierced with a tenaculum, by twisting which a sufficient amount of torsion can usually be made upon the tissue to stop the hæmorrhage until more efficient methods can be devised to control it.

Literature of '97-'98-'99.

In combating the severe hæmorrhage that is sometimes the result of tonsillectomy a purse-string suture may be

placed about the base of the tonsil before the operation or inserted afterward if hæmorrhage is encountered. A heavy silk sterile suture is passed submucously with a curved needle and holder in four stitches about the tonsil and then tightened. It can be readily inserted under eucaine B (10 per cent.) local anesthesia. Dawbarn (Med. News, May 20, '99).

Treatment by galvanopuncture is performed in the following manner: A small galvanocautery-knife is introduced, cold, into one of the crypts of the tonsils, and, being heated while *in situ*, is made to burn its way out. Two or three such burns may be made at a sitting, and will be followed by considerable shrinking of the hypertrophied gland. From five to fifteen such operations are required to reduce the gland to satisfactory dimensions.

In amygdalotomy dissecting the palatine folds half-way off from the tonsil with a small electric cautery; then drawing the tonsil forward and dissecting it out thoroughly to about one-half its extent, cutting this portion off, and treating the surface with a strong solution of silver nitrate is recommended. The other portion of the tonsil is to be removed in the same manner a week or ten days later. J. Homer Coulter (N. Y. Med. Jour., No. 938, '96).

Literature of '97-'98-'99.

Hypertrophied tonsils may be gradually reduced to normal size by massage with the finger. The forefinger, protected by a rubber cot, should be introduced as far as possible behind the tonsil, which should be rubbed fifteen to twenty times with the finger around it, and then up and down the same number of times. The massage, repeated about fourteen times, reduces even the most inflamed and swelled tonsils considerably. Kantorowicz (Deut. med. Zeit., No. 63, '98).

Acute Pharyngitis.

Acute pharyngitis is an acute inflam-

mation of the mucous membrane and underlying structures of the pharynx.

Symptoms.—The constitutional symptoms are usually trifling: A feeling of lassitude with slight fever. The throat feels sore, dry, and stiff. These symptoms increase until pain, especially when deglutition is attempted, is quite severe. The cervical glands are often swelled and painful to the touch. The voice is generally husky; and a sensation, as of a foreign body in the throat, forces the patient to often hawk and expectorate.

Etiology and Pathology.—Acute pharyngitis is generally the result of exposure to wet and cold, especially in persons suffering from a rheumatic diathesis or from general debility. It may also be caused by traumatism or the presence of a foreign body in the pharynx.

The inflammation usually is not evenly distributed over the pharyngeal mucous membrane, the glandular elements always being most affected. Their secretion is at first increased, but after a time decreased, becoming starchy and glue-like in character. The tonsils are always involved, the inflammation being sufficiently marked sometimes as to cause them to mask the inflammation of adjacent structures.

Treatment.—A saline cathartic should be administered, in sufficient quantity to secure one or more free movements of the bowels. A solution of nitrate of silver, 1 or 2 drachms to the ounce of water, should be painted over the inflamed lateral walls of the pharynx once or twice a day. Care should be exercised not to touch the posterior wall, or the patient's suffering will be increased rather than diminished. It should be borne in mind that, while the application of a weak solution of nitrate of silver to the inflamed fauces is painful and acts as an irritant, the application of solu-

tions of the strength of 1 or 2 drachms to the ounce of water is not painful, and is immediately followed by a sensation of relief and comfort, and tends to materially shorten the course of the disease. The application of the silver solution should be followed by spraying the parts with an 8-per-cent. solution of antipyrine. A demulcent gargle or lozenge should also be prescribed for the patient's use. When acute pharyngitis is due to the presence of a foreign body, it should, of course, be at once removed, and the inflamed pharynx treated as ordinary acute pharyngitis. When the rheumatic diathesis exists, the administration of guaiac, either alone or combined with potassium iodide, will be found to yield most excellent results, while in gouty sore throat colchicum should be prescribed.

Simple Chronic Pharyngitis.

Simple chronic pharyngitis is a chronic inflammation of the mucous membrane of the pharynx generally the result of chronic rhinitis. The disease is often complicated by inflammation of the follicles of the mucous membrane, and is then called follicular pharyngitis.

Treatment.—It is all important to bring about a cure of the nasal disease to the presence of which the pharyngeal malady is due. After the primary nasal affection has been relieved simple chronic pharyngitis will often get well almost without treatment. During the treatment of the nasal affection, however, applications should be made to the vault of the pharynx of glycerole of tannin, 40 grains to the ounce, or of a solution containing:—

℞ Iodine, 5 grains.
Potassium iodide, 15 grains.
Glycerin, 1 fluidounce.

A tongue-depressor should be used to

hold the tongue down, and the patient be requested to try to breathe through his nose in order to relax the palatine muscles. The application may then be made without difficulty by means of an aluminum applicator, the end of which has been wrapped with cotton and bent to a suitable curve. Should, however, the palate lie closely in contact with the pharyngeal wall, considerable force will be required to carry the end of the applicator into the post-nasal space, while most of the solution with which the cotton on the end of the applicator has been saturated will be squeezed out and remain in the fauces. Applications made in such a manner irritate the parts mechanically and tend to increase the existing inflammation rather than to subdue it; and it is always best to desist from making an application to the pharyngeal vault under such circumstances.

Atrophic Pharyngitis.

Atrophy of the mucous and submucous tissues of the pharynx frequently exists when atrophic rhinitis is present, being probably the result of an extension of the atrophic process to the pharyngeal mucous membrane; or contact with the respired air not properly warmed and moistened by the atrophic nasal mucous membrane, and dry condition of the faucial mucous membrane, amounting almost to pharyngitis sicca, is found in all mouth-breathers, but disappears spontaneously as soon as the nose has been rendered sufficiently patulous.

The patient complains that his throat feels dry and stiff. Upon inspection, the pharyngeal mucous membrane appears light colored, thin, and as if varnished. The mucous membrane and submucous tissues are so thin sometimes that the outline of each cervical vertebra can be distinguished. Masses of inspissated mucus, perhaps dark colored from the dust

inhaled and swept into ridges by the motions of the soft palate, are seen adhering to the surface of the atrophied tissues.

Treatment.—Attention should be mainly directed to the condition of the interior of the nose, because, when a cure of the nasal affection has been brought about, the concomitant throat disease will improve almost without treatment. The general health should receive attention; and, if necessary, tonics should be prescribed, while constipation should be met by the use of saline laxatives. Iodide and bromide of potash may also be ordered to increase the pharyngeal secretions and diminish reflex symptoms, and a weak solution of nitrate of silver (5 to 15 grains to the fluidounce) should be applied to the atrophied mucous membrane, both above and below the soft palate, to stimulate the atrophied glands to increased secretion, and bring about renewed growth of the atrophied structures. The patient should use Dobell's solution or some other bland alkaline wash as a spray through the nose night and morning in order to remove adherent secretions.

Syphilitic Pharyngitis.

Symptoms.—Syphilitic pharyngitis is an inflammation of the pharynx due to the presence of the syphilitic virus, and may be witnessed during both the primary and secondary stages of the disease. Mucous patches are by no means rare, while gummata or their characteristic cicatrices are very often met with, especially in dispensary practice.

In primary syphilis examination shows a whitish sore, soon followed by swelling of the glands about the angle of the jaw. Secondary lesions may present either the form of mucous patches or erythema characterized by a diffuse redness of the entire fauces; or, in the milder attacks,

by a broad red line extending upward upon each of the anterior pillars and ending abruptly and symmetrically at the root of the uvula. The red lines are almost pathognomonic of syphilis, and persist for a long time after other secondary lesions have disappeared. In secondary syphilis the larynx almost always becomes involved; the voice is hoarse, and there is a short cough of a peculiar metallic character, which, once heard and recognized, is rarely forgotten. Mucous patches and erythematous areas in the throat are almost always symmetrical,—that is, both sides of the throat are attacked in corresponding localities by similar lesions,—while tertiary lesions do not so constantly present this symmetry. Gummata more frequently involve the tonsils or soft palate than other parts of the throat. A gumma may be absorbed under treatment, or, breaking down, result in an ulceration. When an ulcerating gumma is situated upon the posterior wall of the pharynx, the cervical vertebræ, or even the cervical cord itself may finally become involved, and a fatal issue result. In such cases also when the ulceration has involved the posterior surface of the palate, care is required to prevent union of the soft palate and uvula to the pharyngeal wall. Where union has actually taken place, it is difficult at a subsequent period to permanently restore satisfactory communication between the oro-pharynx and naso-pharynx by any operation, because of cicatricial contraction after the operation.

Treatment.—In pharyngeal syphilis, as in syphilis everywhere, constitutional treatment is of primary importance. If the symptoms are urgent, the hypodermic method of administering mercury should be employed, as it gives the most speedy results. Local treatment consists

in maintaining perfect cleanliness of the diseased parts, and stimulating mucous patches and ulcerations to heal by daily applications of the acid nitrate of mercury, diluted with five parts of water. The remedy is effective, but painful, and almost equally satisfactory results are sometimes obtained by touching the ulcers with nitrate of silver, 60 grains to the ounce of water.

Retropharyngeal Abscess.

An abscess of the posterior pharyngeal wall may be hidden above and behind the soft palate, and require the rhinoscope to ascertain its outline; it may be situated opposite the larynx and only be partly visible with the laryngoscope; or it may be situated in such a manner as to be hidden by one of the posterior pillars of the pharynx. However, the most common seat of abscesses is the posterior wall of the pharynx opposite the oral cavity.

It may occur as the result of phlegmonous inflammation of the cellular tissue of the pharynx, or from the breaking down of an inflamed lymphatic. Caries and necrosis of the vertebræ or temporal bone are occasional causes of the affection.

There is usually but slight systemic disturbance. Local symptoms are usually the first to attract attention, especially in infants, among whom the disease is the more common. When the abscess is situated high up upon the pharyngeal wall, a sensation suggesting the presence of a foreign body causes almost constant hawking and spitting, while there may be present obstructed nasal respiration with more or less pain and tinnitus. When the abscess is opposite the larynx, dyspnoea is a marked symptom, appearing in "spasms," which may endanger the patient's life, while swallowing of liquids or solids is danger-

ous, owing to their passage into the larynx. An abscess in the pharyngeal wall opposite the oral cavity presents none of these symptoms unless it is very large.

Treatment.—Left to itself, a retro-pharyngeal abscess will discharge either into the throat or at some remote point; but it should be opened as soon as a diagnosis is made, by means of a curved small trocar and cannula. Should the pus recur, an incision should be made into the abscess at its lowest part, and the opening maintained patulous by the daily passage of a probe.

Tumors.

Any of the varieties of tumor found in other parts of the body may occur in the pharynx. They are most frequently located in the lateral walls and may involve the surrounding structures. In the following order of frequency are found in the pharynx: Gumma, sarcoma, carcinoma, lupus, papilloma, cysts, fibroma, osteoma, enchondroma, adenoma, and aneurisms.

When the growth is large, it may become an obstruction to deglutition or even respiration. In carcinoma and ulcerating lupus, pain is present, usually radiating into the ear.

Literature of '97-'98-'99.

Carcinoma of the pharynx and larynx usually runs a rapid course, attended with the characteristic lancinating pains, constant and often intolerable. As regards the fauces, there is, coincident with pain during deglutition, a stiffness of the angle of the jaw; an intense, boring, ever-present pain in the ear is often the chief complaint. The tonsil, the most frequent starting-point, at first presents a dark-red appearance, with a grayish-white spot in the centre; the surrounding tissues on the affected side are hyperæmic; it subsequently exceeds the confines of the tonsil and rapidly spreads over the surrounding tissue in a cauliflower-like manner. J. S. Gibb (*Medicine*, Jan., '98).

Early extirpation with the knife, galvanocautery, or snare should be practiced.

E. B. GLEASON,
Philadelphia.

TOXIC AMBLYOPIA.

Definition.—Impairment of vision through poisoning with certain substances. It may or may not be associated with organic changes in the retina or optic nerve.

Symptoms.—Impairment of vision may be quite sudden or gradual. It occurs without pain or inflammation about the eye or other obvious signs. The visual field is encroached upon, and sometimes greatly limited. The failure of sight is commonly progressive, until the source of poisoning is removed, or the vision greatly reduced. If the cause is not discovered and its influence checked, optic atrophy is likely to follow.

ALCOHOLIC AMBLYOPIA (amblyopia ex-abusa) closely resembles that produced by tobacco. Both poisons share in the causation of many cases. Where alcohol is an important factor, the amblyopia may appear at an earlier age; and there is greater redness and obscuration of the optic disk, with subsequent atrophy of the temporal quadrant. There may also be limitation of the periphery of the visual field, and atrophy of the whole optic nerve. Methyl-alcohol also causes blindness, with atrophy of the optic nerve. The essence of Jamaica ginger, sometimes used as an intoxicant, also produces amblyopia.

TOBACCO-AMBLYOPIA is characterized by central scotoma, larger and more frequently complete for colors than for form. It commonly occurs after the age of forty, and is very rare in youth. It often develops when the general health is impaired, and sometimes suddenly.

The ophthalmoscopic symptoms are a slight and uncertain redness and blurring of the optic disk, followed, in severe cases, by pallor of its temporal quadrant. In the optic nerve evidence of inflammatory and degenerative changes of the nerve-fibres supplying the macula has been found, and the affection has been regarded as a retrobulbar neuritis. But it is not certain that the essential lesion is of this character.

AMBLYOPIA FROM IODOFORM may occur when it is used internally in full doses or as a dressing for large raw surfaces. The visual disturbance appears suddenly after the drug has been used some time, and includes central scotoma, with obscuration of other parts of the visual field. Other symptoms of iodoform poisoning—fever; rapid, soft pulse; diarrhœa; headache; and stupor—are usually present.

AMBLYOPIA FROM BISULPHIDE OF CARBON occurs among workmen exposed to the fumes of this agent during the process of vulcanizing rubber. It closely resembles tobacco-amblyopia. The general symptoms accompanying it are: vertigo, irritability, and excitement; and, later, dejection, anæsthesia, and muscular weakness.

AMBLYOPIA FROM NITROBENZOL is marked by central scotoma and contraction of the periphery of the visual field. The pupils are dilated, the eye-ground much darker than normal, and the retinal veins dilated and tortuous. The general symptoms are headache, muscular weakness, mental disturbance, and cyanosis. It occurs in those exposed to the dust or fumes of the drug, while making certain explosives and perfumes.

QUININE-AMBLYOPIA follows the taking of large quantities of the drug, usually several drachms, but it has been encountered after use of as little as 15

grains. The general symptoms of fullness and ringing in the ears and head, deafness, etc.; these precede the blindness, which comes on only after several hours or days. Loss of sight is rapid, being usually complete in a few hours. The pupils are dilated, the optic disk white, and the retinal arteries and veins greatly contracted. The field of vision, especially the field for colors, is greatly narrowed.

SALICYLIC ACID and the SALICYLATES and ACETANILID may cause amblyopia like that from quinine.

LEAD POISONING may cause blindness, with atrophy of the optic nerve.

Diagnosis.—Sudden or rapidly progressive amblyopia should always raise the suspicion of a toxic origin. Inquiry will elicit the history of exposure to one of the above noxious agents. Testing the field of vision will determine the diagnosis. The especial characteristic of the one group of amblyopias, such as that from tobacco, is the central scotoma; but the patient may not at first recognize that the cloud he complains of before his sight is confined to the centre of the field of vision. In the same way, until attention is called to it, limitation of the field of vision may not be appreciated by the sufferer from quinine-blindness or similar affections.

Prognosis.—When exposure to the toxic influence is continued useful vision is likely to be lost. With prompt and early suspension of the poisonous agent, the loss of sight will be checked, and often practically normal vision may be regained. For tobacco-amblyopia, the chance of full recovery is very good, if the case is treated properly during the first few weeks; and after many months prolonged treatment may produce great improvement in vision. Quinine-blindness is at first complete, but almost al-

ways some vision returns, and central vision may become normal. Some narrowing of the field of vision remains permanently in all severe cases. The amblyopia from methyl-alcohol may improve for a time, and then grow worse to complete blindness with optic atrophy. In general, the severity and duration of the poisoning influences the completeness of final restoration of sight.

Treatment.—The first and the essential point is to stop the entrance of the poison, by total cessation of its employment in any form; the use of tobacco and alcohol, as with all other toxic agents, must be given up. The administration of iodoform, quinine, salicylic acid, or acetanilid must be suspended. Workers with carbon bisulphide, nitrobenzol, or lead must change their occupations. The elimination of the poison may be hastened by potassium iodide in moderate doses, Turkish baths, and pilocarpine sweats. The general health should be looked after at every point. Strychnine is to be given in increasing doses up to the limit of tolerance.

EDWARD JACKSON,

Denver.

TOXIC FOODS.

Ptomaines and Toxins.—The word *ptomaine* has been pretty generally abandoned as inapplicable to the toxic elements of decomposition it was intended to represent. Although it implies the presence of a poisonous product, it is now known that many ptomaines—cholin, neuridin, putrescin, etc., for instance—are not poisonous, though extracted from dead bodies. The term, therefore, fails to isolate the truly toxic products such as neurin, present in decomposing meat; peptotoxin, found in some peptones; muscarin, found in the *Amanita muscaria*

mushroom, the venom of snakes, etc.; and the term “toxin” has therefore been generally adopted to distinguish the latter group, just as it has to another group associated with the pathogenesis of various affections, such as diphtheria, cholera, etc. Upon a special group of toxins, originating in the putrefaction of proteid substances, through the metabolism of putrefactive bacteria of dead bodies, therefore, mainly depend the effects of toxic foods.

When these toxins (nitrogenous bases) are compared to alkaloids (vegetable bases), many of which, aconitine, conine, veratrum, etc., are well known to the practitioner, they may be said to be at least very similar, no reliable test, capable of distinguishing them as a group from these, having, as yet, been discovered. Indeed, toxins of putrefaction have been taken for vegetable alkaloids by expert toxicologists.

Emphasis laid upon the grave responsibility attached to expert testimony and to the importance of noting the slightest deviation or departure from characteristic reaction, and of guarding against every possible source of error or fallacy. In cases of poisoning ptomaines might be detected as vegetable alkaloids in the stomach-contents, and the vomit and post-mortem features may be corroborative. It is very possible that in such cases where the opportunity of detecting a powerful poison exists, according as circumstantial or collateral evidences present themselves, suspicion of murderous intent may or may not be attached to any person or persons.

Delphinine is closely simulated by a ptomaine. Conine also has a near relative in the products of cadaveric decomposition. In the Krebs-Brande case, at Braunschweig, in 1874, this alkaloid was found even in undecomposed parts of the body. Morphine has its animal homologue, which was mistaken for it in the Sonzogna trial at Cremona. Farquharson (Jour. of State Med., Jan., '93).

The toxins begin to develop in the dead body about twenty-four hours after death when the latter is due to normal causes, though a diseased animal may show evidences of putrefaction much sooner. The putrefactive process continues until complete disintegration and chemical transformation of the organic tissues occur, one class of toxins being replaced by others which are frequently of greater toxicity. When a sufficiently active dose—less than one-hundredth of a minim in the case of some toxins—is introduced into the human organism through the agency of tainted or putrid foods, illness may prevail.

The likelihood of toxic symptoms depends to a great degree upon the condition of the animal partaken of at the time of its death. Thus, spoiled or tainted veal, obtained from healthy animals, rarely gives rise to serious accidents. But if, as is frequently the case, the animal, when slaughtered, suffered from pyæmic or septicæmic inflammatory processes, or septic diarrhœa, grave symptoms may occur in the person partaking of it.

While many cases of poisoning may be attributed to toxins,—i.e., bacterial products,—living bacilli such as are ingested with contaminated water in the case of typhoid fever or cholera may also be productive of poisoning when food containing them is used. We have in the toxic oyster an example of food acting as the medium for the transportation of an infectious germ, though, in all probability, the mollusk itself is not diseased. When, going a step farther, we closely examine the clinical history of most cases of cholera morbus and compare it to that of food poisoning, the resemblance is so great that we cannot but be led to conclude that in at least many cases of the former disorder we are in

the presence of food infection, in an individual unduly susceptible, perhaps, to the micro-organism that may be present, or to its toxin. This would tend to suggest that many more cases of food-infection are met with, in practice, than is generally believed.

Foods of all kinds may thus become the source of toxic symptoms through the effects of putrefaction; they may transmit various micro-organisms: those of tuberculosis, typhoid fever, trichinosis, etc. Vegetable matter used as food, grains, fungi, etc., represent exceptions to this rule.

Apart from added poison and parasitic disease, meat may become poisonous in three ways: (a) from the presence of disease, at the time of slaughter, in the animal from which the meat is derived: (b) from micro-organisms which attack or develop in meat subsequent to slaughter; (c) from the presence of toxalbumoses or of ptomaines. Mann (*Med. Chronicle*, July, '96).

Literature of '97-'98-'99.

Outbreaks of disease due to meat poisoning are dependent upon infections by living bacilli. Only two kinds of bacilli are definitely related to the etiology of such outbreaks, namely: the bacillus enteritidis of Gärtner and the anaërobic bacillus butyricus of van Ermenghem. Of these the former is the more important. Whenever the source of the illness was traced, the animal supplying the meat was found to be diseased. The cow and the calf are the animals especially liable to furnish the bacillus. Herbert E. Durham (*Brit. Med. Jour.*, Dec. 17, '98).

Meat Poisoning. — SYMPTOMS. — The symptoms produced by poisonous meat may be grouped in two divisions: (1) those due to a true infection; (2) those due to simple poisoning. In the first division the train of symptoms runs the usual course of an infectious disease, as shown by the occurrence of symptoms

suggesting typhoid fever in a large number of people who had eaten of meat from an animal killed while moribund. In the second division the symptoms usually resemble those due to acute gastro-enteritis: violent vomiting and purging; rapid loss of strength, with extreme depression; cramps in the calves of the legs; and general coldness of the surface, with subnormal temperature. In these cases the average prodromal period is shorter than in those of Class 1, and the acute stage of the illness does not exceed a few days at the longest. (Mann.)

The histories vary considerable, however. Diarrhœa is not always witnessed, neither is vomiting a feature, probably depending upon the intestinal area involved (Durham). At times the temperature is raised. Pneumonic symptoms may also appear, while the frontal cephalalgia and marked symptoms of influenza may suggest the presence of this disease. Great weakness attends all cases. Herpes labialis, rashes, and desquamations occasionally follow the active period.

ETIOLOGY.—Any kind of meat, beef, mutton, lamb, etc., may, when more or less putrid, give rise to symptoms of poisoning, but various combinations or modes of preparation show a special tendency in this direction. Sausage poisoning prevails especially in Germany, where outbreaks are quite frequent. Pork-pie, ham, and veal-pie represent prolific causes of poisoning in England and France. Any kind of fowl—turkey, chicken, goose, etc.—may be recorded among the foods that have given rise to serious poisoning, —though in some cases no evidence of putrefaction could be discerned. An outbreak of typhoid may be suspected in wholesale poisoning, as in the memorable case at Sabina,

Iowa, in which forty or fifty guests at a wedding banquet who had partaken of a chicken-salad were attacked by what seemed to be in many cases typical typhoid. This claim was actually set up as part of the defense in the numerous damage suits that were brought.

Meats mainly acquire toxic properties through delay in their use as food after slaughtering of the animals from which they are obtained; and imperfect preservation, whether this be by means of freezing, canning, salting, or smoking, plays its part in this, merely because it imperfectly counteracts the putrefactive process: *i.e.*, the formation of toxins. We have also seen that infection can also be due to disease of the animals or to infection of the meat before ingestion. All these features are to be considered simultaneously when prophylactic measures are to be instituted.

PROPHYLAXIS.—In Paris the seizure of meat is considered justified and is made (1) when deprived of all edible qualities; (2) when its ingestion might be followed by injurious consequences; (3) when from some reason or other it has derived qualities rendering its taste repugnant. Under the first head comes the flesh of animals that have been killed too young, and of those that are either dropsical or cachectic; under the second, that of animals affected with disease, such as fever, septicæmia, anthrax, tuberculosis, etc. The signs which guide the inspector in condemning the flesh of cachectic animals are chiefly the wasted condition, the absence of fat about the omentum, and the lack of resistance in the muscular tissue. With regard to animals that have died of inflammatory diseases the signs are: 1. A general tarnished coloration, more or less deep red. 2. A capillary injection of the fat, which in extreme cases is penetrated deeply by it.

3. Arborescent markings on and a tendency to a livid coloration of the serous membranes. 4. A violet tint of the kidneys. 5. A brown or blackish coloration of the spongy bone, seen best in the vertebrae. 6. Loss of firmness in the muscular tissue.

In Brussels the conditions under which the flesh of tuberculous animals is seized, no matter how good its general condition, are: 1. (a) Tubercle having its seat in both thorax and abdomen; (b) tubercle, whether it be thoracic or abdominal, with presence of tubercles in any other part of the body outside these cavities; (c) tubercle generalized in the following organs: lungs, pleurae, peritoneum, liver, or mesenteric glands; (d) tubercle of the lungs or pericardium involving the pleura extensively; (e) tubercle of any organ of the abdomen involving the peritoneum extensively. 2. Tubercle observed in no matter what part of the body, or what the number of tubercles, when the animal is markedly wasted.

No slaughtering can take place in Berlin except at the abattoir, and no meat can be sent away from the abattoir without first being stamped as having passed the expert examination. The inspection is entirely in the hands of veterinary surgeons. They make, first, a rough inspection of the carcass and cut into the glands of the neck, especially the retropharyngeal. The liver and lungs of every animal must also be cut into. If the appearances are suspicious, the surgeon further examines the spleen and the various glands of the body. The flesh of all animals affected with tuberculosis, but not so extensively as to justify total seizure, and of those in which only a few cysticerci are found, is cooked for two hours in boiling water, and twice a week sold to the poor for a trifle.

In Copenhagen, also, a slaughter of animals can take place only at the slaughter-house, where the veterinary inspection is made. All the animals are first inspected as they stand in the market, and any animal found with dangerous infectious disease is isolated and slaughtered apart from the others. None of the organs may be removed until the veterinary surgeon has made his rounds. The latter, after a general inspection of the carcass, cuts into the glands of the neck, examines the pleurae, peritoneum, lungs, and liver, and, should there be nothing wrong with them, allows the meat to be stamped with a blue mark, as of good quality. If he find any inflammation or suppuration about them, he undertakes a methodical examination, not only of those of the neck, but also of the submaxillary, axillary, bronchial, mesenteric, inguinal, and lumbar glands. Cysticerci are always looked for by cutting into the muscles at the root of the tongue. Tubercle, when generalized, is deemed a sufficient cause for seizure, but not when localized. A black stamp is freely used to mark meat as of second-class quality which is not considered sufficiently diseased to warrant seizure.

Shell-fish and Fish Poisoning.—**OYSTERS.**—Of late this mollusk has occupied quite a prominent place among the toxic foods. In temperate zones such effects are seldom witnessed, but in tropical and subtropical countries oysters, which can be eaten without danger at certain times, become poisonous at others. In temperate zones, therefore, the toxicity is not, as a rule, inherent in the oyster, it is due to sewage-contamination or to infection of the pit in which the shell-fish is stored through insufficiently frequent renewal of the water.

Result of an examination of a sample of water taken from one of the oyster-pits in which oysters were kept awaiting sale, and in which the water had been allowed to stand unchanged for several days. The original water contained about 400 micro-organisms per cubic centimetre, whereas in the stagnant water these had increased to over 10,000. Artificial pits for the storage of oysters should be either situated between high and low tide, and so get their waters renewed every twelve hours, or, if placed beyond the reach of the ordinary tides, provision should be made for the frequent renewal of the water; oysters should be consumed as soon as possible after leaving their beds. David Houston (*Jour. Essex Technical Laboratories; Brit. Med. Jour.*, Dec. 19, '96).

To oysters, as is well known, have been traced cases of typhoid fever (see **TYPHOID FEVER, ETIOLOGY**, in this volume). In a case recently reported by Renon marked urticaria developed, accompanied by a sharp attack of arthritis.

MUSSELS.—Mussel poisoning may be due to a toxin, mytilotoxin, found chiefly in the liver of this shell-fish; or to contamination through a prolonged sojourn of the latter in foul waters. Here, however, the symptoms vary somewhat from the classical manifestations, in that the nervous system seems to be more actively involved, profound collapse ensuing rapidly.

SHRIMPS AND LOBSTERS.—Potted shrimps (*Lancet*, Sept. 17, '98) recently caused forty persons to suffer from violent gastro-intestinal symptoms at St. Ann's-on-the-Sea. In this region the shrimp-nets are piled for some miles along the coast, where a deep channel divides the foreshore from the shallow banks. It is said that the shrimps were caught, potted, and used the same day. No deaths occurred, though some of the cases were serious. The fishermen con-

tend that the shrimps were caught where there could be no sewage pollution.

Lobsters and crabs are, of shell-fish, those most feared, but, judging from the few cases of poisoning credited to them, it is probable that they are no more toxic than other edible substances of the same class. Symptoms of typhoid may not only prevail, but the Widal test may sustain such a diagnosis, as in a case reported by Shram (*Medical News*, Nov. 20, '97).

FISH.—Cases of poisoning by salted salmon have been reported. Out of eleven cases witnessed by Arnstamoff, five died. The fish was not putrid, though peculiarly soft. The chief symptoms, which developed in ten to twenty hours after the ingestion of the fish, consisted of general weakness, abdominal pains, dyspnoea, mydriasis, diplopia, vertigo, dryness in the mouth, dysphagia, aphonia, obstipation, anuria, and reduction of temperature. The pathologico-anatomical examination showed nothing specific other than death from asphyxia. The microscopical and bacteriological examination of the organs demonstrated the presence of a large number of micro-organisms which bore considerable resemblance to the typhoid bacillus.

The salted sturgeon has also proved fatal to many persons in Russia, the bard in central Europe, and the tetrodon in China and Japan. Some of the varieties of the latter fish are extremely toxic, causing death in some cases in less than an hour. The poison may be either due to a venomous glandular secretion or to bacteria or their toxins.

Cream and Cheese.—The toxic effects of milk have been considered in various articles, particularly under **INFANTS, DIARRHOEAL DISEASES OF** (volume iv), and **TYPHOID FEVER** (volume vi), and the reader is referred to these.

Ice-cream dealt out in the streets of London by itinerant vendors frequently causes death among the poorer classes. The cold of this food benumbs the sense of taste, and the combination of stale eggs and sour cream passes unnoticed down the gullet of the victims, almost invariably children. The quarters of the vendors are, as a rule, filthy, thus affording a prolific source of contamination. The symptoms do not vary from those already described: the manifestations of acute gastro-enteritis.

Treatment of Toxic-Food Poisoning.

—The first indication is to remove the offending matter from the alimentary canal. Thorough washing out of the stomach, as soon as possible, with a siphon-tube till the washings come away clear is advised. While the good effect of this is apparent, a few cases may relapse within a couple of hours. A second washing in these cases prevents the occurrence of further relapses. Stimulants, chiefly in the form of brandy and strychnine, may then be administered, and an attempt made to clear the bowel of its irritating contents by castor-oil or other purgatives. In many cases, especially if symptoms of collapse supervene, the use of external heat (hot-water bags or hot bottles) will be found useful in conjunction with the brandy and strychnine, which is best given hypodermically.

Grain and Vegetable Poisoning.

ERGOT.—Rye often becomes the host of a fungous parasite, *Claviceps purpurea*, when grown on virgin soil or when the soil is carelessly cultivated. Consumers of rye-bread, especially numerous in some parts of Europe, are therefore exposed to its effects, and epidemics of ergotism have thus been caused, and are apt to occur immediately after harvest. These are attributed to two active principles: cornutin and sphacelinic acid.

Cornutin gives rise to marked nervous symptoms, the earliest of which are headache, formication in the extremities, and great weakness. These symptoms gradually increase in intensity until cramps, convulsions, contractures, delirium, and sometimes dementia, and symptoms of spinal sclerosis appear. Abortion also occurs in pregnant women. When a change of diet is resorted to, the symptoms gradually subside, but when the disease has induced contracture, the latter is overcome with difficulty. Sphacelinic acid, on the other hand, is thought to cause gangrene, beginning at the hands and toes, and preceded by formication, pain, spasm, anæsthesia, and coldness. The disease proceeds as does true gangrene and is often complicated with pulmonary infarcts or septic pneumonia, followed by early death.

CORN.—Contaminated cornmeal bread often causes, especially in Italy and Spain, a disease termed *maidismus*, or *pellagra*, attributable also to putrefactive changes and to the formation of toxins. It is generally observed when fresh, moist cornmeal is used. The early symptoms are mainly gastro-intestinal and cutaneous: indigestion, diarrhœa, anorexia, general weakness, roughness of the skin, and erythema, sometimes complicated with the formation of superficial abscesses. Later on, marked nervous symptoms appear: spasm, paraplegia, cephalalgia, delirium, or hebetude, sometimes attended with exacerbations of violence with suicidal tendencies. Death from marasmus or some complication is apt to occur if the introduction of the toxic principle is continued.

CHICKEN-PEA.—This seed is often mixed with others used as food, and may cause, after prolonged use, nervous dis-

orders of spinal origin, transverse myelitis especially.

SPROUTING POTATOES.—These may at times contain a poison, solanine, an alkaloid of its botanical group, resembling in effects those of belladonna, stramonium, hyoscyamus, and tobacco. Pfuhl recently reported the cases of sixty German soldiers who became ill at the same time with symptoms of gastroenteritis after partaking of some cooked sprouting potatoes. The symptoms were collapse, prostration, with more or less jaundice. During sprouting much more solanine is developed. In using such potatoes care should be taken to thoroughly peel the vegetable and take out the "eyes" deeply, thus minimizing the danger. Pfuhl attributes many mild cases of acute indigestion and diarrhoea to this cause.

Treatment of Grain and Vegetable Poisoning.—This limits itself to removal of the cause and to treatment recommended under the previous heading.

Mushroom Poisoning.—Probably the most dangerous feature connected with the use of fungi as food is the belief that the ordinary tests utilized in the average household are at all reliable. Depending upon the taste or odor of the mushroom, or the fact that it does not blacken a silver object while cooking, merely detracts the attention from the only comparatively trustworthy tests: the botanical characteristics. This implies the necessity of adequate knowledge in mushroom gatherers. That more cases of poisoning do not occur is because those who supply green grocers and other dealers either cultivate them or limit their selection to fungi of a few kinds known to be generally used with impunity. Safety lies with them in the self-imposed restriction of not picking

mushrooms with which they are not absolutely familiar. Amateur gatherers are to be feared in this connection; and it is always best to refrain from using mushrooms obtained from such a source unless the gatherer be known to possess due competence.

Literature of '97-'98-'99.

A novice who proposes to gather mushrooms for himself should never use a species for food until he has found out positively its name and its non-poisonous character. He should then familiarize himself with this species until he knows it from all others as certainly as he knows the cabbage, the turnip, the cauliflower, or any other of our common vegetables. He should confine himself rigidly to this his personal edible list, and should add to it only as thus recommended. His authority for the name and qualities of each kind he adds to this list should be some person having an unquestioned expert knowledge of mushrooms. There is no single test and no safe series for poisonous mushrooms. F. V. Coville (Division of Botany, United States Department of Agriculture Circ. No. 13, '98).

There is only one rule to be followed in avoiding poisonous mushrooms, and that is to know that the particular variety is safe because it has been eaten with impunity. That is, the one who picks the mushrooms should be able to say that he knows a kind to be good, not because it has this or that characteristic, but because he recognizes it as one that he has tried. Editorial (Northwestern Lancet, Jan. 1, '98).

Edible Mushrooms.—Four varieties of mushrooms were found in Washington markets by Mr. F. V. Coville, Botanist of the United States Department of Agriculture. These about represent the kinds generally sold elsewhere in the country and with which most persons are familiar. They do not, however, include all the edible fungi, but a series within which safety always lies, provided no idiosyncrasy in the consumer, insuffi-

cient cooking, or injudicious consumption, especially by children, intervene to give rise to untoward effects. Indeed, death has resulted under such circumstances from the use of perfectly-identified edible mushrooms.

Literature of '97-'98-'99.

In fresh specimens the surface of the *Agaricus campestris* (Fig. 1) is white, but various shades of the light brown, either plain or checked, are often found. The gills in a newly-expanded mushroom fresh from the field are of a beautiful and delicate pale-pink color, often with a tinge of salmon. The gills end toward the centre with an abrupt upward curve without being attached to the stem as in some other kinds of mushrooms.

As they grow older, especially after they are picked, the gills turn in a few hours to a light brown and finally to a dark chestnut-brown, almost black, color. The usual diameter of fully-expanded specimens of the common mushroom is one and a half to three inches, though smaller and larger specimens are sometimes found. When one day old, a mushroom is usually still edible, but insect-larvæ soon attack it, traveling up through the stem into the cap, and decomposition rapidly follows.

About Washington the common mushroom occurs oftenest on lawns and in pastures and especially in neglected fields where weeds have been succeeded by a scant covering of grass. F. V. Coville (Circ. No. 13, Division of Botany, U. S. Dept. of Agriculture, '98).

While the horse-mushroom (*Agaricus arvensis*, Schaeffer—Figs. 2 and 3) agrees in most details with the common mushroom, the surface of the cap is darker colored than in *campestris*, though specimens of a considerably lighter shade of brown are often found; it is larger, and the ring is wider and thicker than in the other. Usually the ring is distinctly marked on its upper surface by a series of lines where the edges of the gills before expansion have pressed against it. The horse-mushroom is not always distinguished from the common mushroom

by the market people, and, indeed, in its technical characteristics it is closely related to that species. Its characteristic place of growth about Washington is not in fields, but in gardens, especially very rich or heavily fertilized ones, where it often occurs in cold frames or around hot beds. F. V. Coville (Circ. No. 13, Division of Botany, U. S. Dept. of Agriculture, '98).

In the fairy-ring mushroom (Fig. 5—*Marasmius oreades*, Bolt, Fr.) the stem has no ring. The gills are comparatively few and far apart; and the cap, as it becomes widely expanded, has a peculiar knob-like projection in the centre. The cap and stem have a pinkish-buff color, and the gills a lighter shade of the same, varying in its younger stages toward a cream color. The spores are white, and in ascertaining their color the cap should be laid on some dark-colored, preferably black, paper. The fairy-ring mushroom is one of the commonest species on the lawns in the city of Washington. In general, they can be found in any old and well-kept lawn. The ring (Fig. 4) is due to the uniform annual growth of the mycelium. This, starting at a central point, grows each year a few inches outward, the older portion beginning to die at the centre. Thus a small circular band is formed and each year this increases in size, growing regularly on the outside and dying as regularly on the inside.

The fairy rings, except when young, seldom form complete circles, usually appearing as broken rings or crescents. Several crops of mushrooms are produced on a single ring during a season. The most abundant crop coming after the autumn rains. F. V. Coville (Circ. No. 13, Division of Botany, U. S. Dept. of Agriculture, '98).

Not only are the spores of the shaggy mushroom black, but the whole plant, beginning at the outer edge of the cap, dissolves when the mushroom is about a day old, into an inky-black fluid (Fig. 6). Some of this inky fluid has dropped from the large specimen upon the small one at the left and has run down its stem. At the right is a specimen showing the characteristic appearance of the cap which, except in its latest stages, has



Fig. 1.—Common mushroom (*Agaricus campestris*). Edible. Three-fourths natural size.



Fig. 2.—Horse-mushroom (*Agaricus arvensis*). Edible. One-half natural size.



Fig. 3.—Horse-mushroom (*Agaricus arvensis*) button. Edible. Three-fourths natural size.

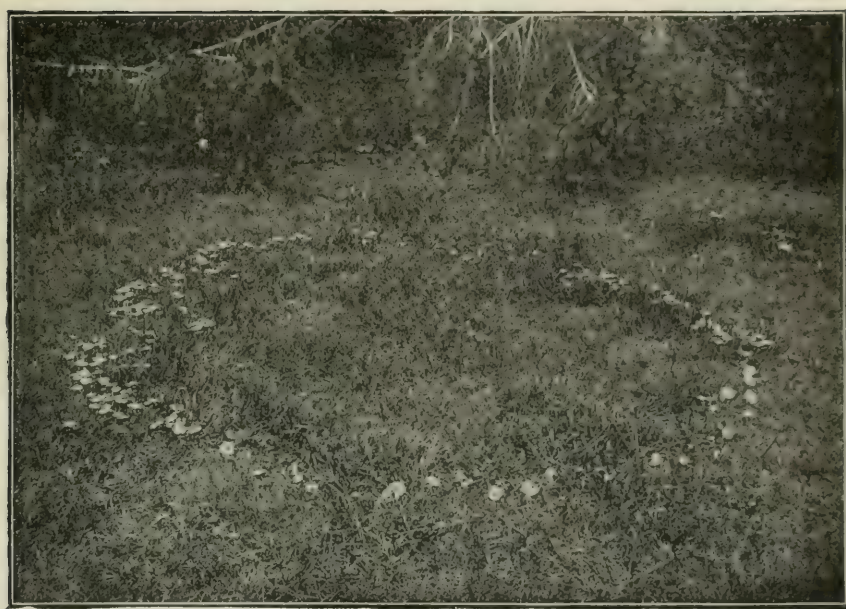


Fig. 4.—Fairy ring formed by *Marasmius orcadus*; an edible mushroom.

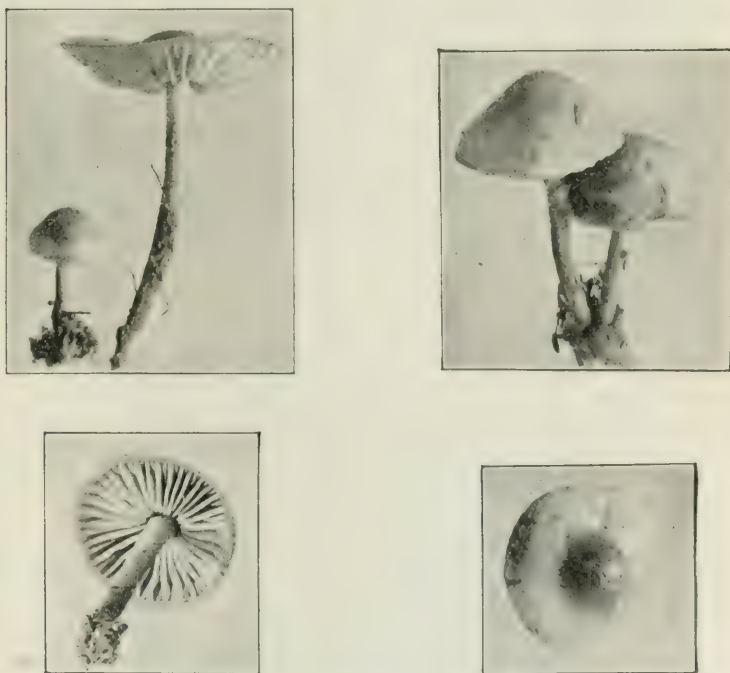


Fig. 5.—Fairy-ring mushrooms (*Marasmius orcadus*) viewed from several directions. Edible. Three-fourths natural size.

somewhat the form of a closed umbrella. In their early stages the cap, gills, and stem are white, excepting frequently the apex of the cap, which is often dark-colored, as in the figure. The surface of the cap is covered with delicate lacerated scales. The ring is only very loosely attached, either to the stem or to the margin of the cap, and sometimes is wholly free from both, early dropping down to the base of the stem. In the white part of the cap the juice is as colorless as water; toward the margin it is wine colored. In this stage the mushroom is still in condition to be eaten, but when the juice turns black the mushroom is too old for the table. This mushroom has as its favorite place of growth, not fields and pastures, but shaded situations, where the ground is rich or well supplied with thoroughly decomposed wood or other vegetable matter.

It grows in greatest abundance in the low grounds near the Potomac, shaded by willows or rank weeds. The season of greatest abundance is the late autumn, in November and early December. F. V. Coville (Circ. No. 13, Division of Botany, U. S. Dept. of Agriculture, '98).

The exterior color of the puffball, edible (*Lycoperdon cyathiforme bosc*) is brown (Figs. 7 and 8), and the outermost part of the covering is usually more or less distinctly and irregularly checked, the white color of the interior showing between the darker, raised areas. Within at its earliest stage the flesh is of a milk-white color, solid, and without an appreciable juice. Within two or three days it becomes soft, turns yellowish, develops a watery and later an amber-colored juice, and continues its development through later stages.

In the left-hand specimen of Fig. 9 the entire contents have changed from yellow to brown, the juice has dried out, the outer coatings on the upper part have been broken up and blown away, showing only in brown and gray at the lower edge of the specimen, and the interior mass of dust-like spores and fluffy, minute brown threads exposed to the air.

Other species of puffball grow in the District of Columbia, but only two others, so far as known, approach this in size.

The small species are commonly an inch or less in diameter, while the commoner of the two large species has an almost pure white surface, and when old the spores it produces, like those of the other large one, are yellowish brown instead of purplish brown as in the present species. None of the puffballs with a pure white interior are known to be poisonous.

About Washington puffballs are found commonly in the autumn on lawns and in pastures, especially upon the vacant lots at the edge of the city serving as "commons," where the soil has remained undisturbed for many years and has been closely grazed by cattle. F. V. Coville (Circ. No. 13, Division of Botany, U. S. Dept. of Agriculture, '98).

[If there is any suspicion through lack of confidence in the dealer, etc., that the mushrooms on hand might be toxic, the following process, used by market-women in Washington, according to Mr. Coville, can be employed before they are prepared for food. The stem is scraped, the gills are removed, and the upper part of the cap is peeled. The mushrooms are then boiled in salt and water—which removes any toxalbumin that may be present,—then steeped in vinegar—which removes the alkaloid. ED.]

Poisonous Mushrooms.—The toxic effects of mushrooms are mainly due to two alkaloids: muscarine,—formed by the oxidation of choline in the *Agaricus muscarius*,—and phalline, contained especially in the *Amanita phalloides*. Phalline is a toxalbumin of extreme violence, and is a poison also found in some venomous animals, such as the rattlesnake. In both species of mushrooms, however, there are other chemical substances whose nature have not as yet been determined.

Literature of '97-'98-'99.

The fly-amanita, poisonous (*Amanita muscaria*), is the commonest of the poisonous mushrooms of the District of Columbia. The points especially to be noted are the bulbous enlargement at



Fig. 6.—Shaggy mushroom (*Coprinus comatus*). Edible. Three-fourths natural size.

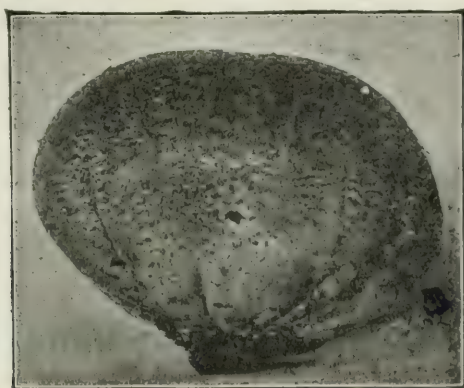


Fig. 7.—Puffball (*Lycoperdon cyathiforme*), side-view. Edible. Three-fourths natural size.

the base of the stem, breaking into thick scales above, the very broad drooping ring near the top of the stem, and the corky particles loosely attached to the smooth, glossy, upper surface of the cap. The stem, the gills, and the spores are white, the corky particles commonly of a buff color, but varying sometimes to almost white. The glossy, upper surface of the cap, beneath the corky particles, varies from a brilliant red to orange yellow, and even white. Commonly in the vicinity of Washington the coloration is orange in the centre, shading to yellow toward the margin. Brilliant-red ones are rarely seen here, but white ones are

It is abundant about Washington in the fall, growing in pine-woods, a favorite situation in these woods being the vicinity of abandoned hog-beds. F. V. Coville (Circ. No. 13, Division of Botany, U. S. Dept. of Agriculture, '98).

The stem of the death-cup, poisonous (*Amanita phalloides*), is set in a sort of white cup, the upper portion of which surrounds the base of the stem like a collar. This species resembles muscaria in its broad ring and in the white color of its stem, gills, and spores. The upper surface of the cap, however, is usually smooth and without corky particles, glossy, viscid, and of a white or slightly-



Fig. 8.—Puffball (*Lycoperdon cyathiforme*), top-view. Edible. Three-fourths natural size.

of not infrequent occurrence, especially late in the season. It sometimes happens that the corky layer does not break up into particles, but simply stretches as the cap expands. Such a specimen, if it is of a pale-buff or white color, would not be taken by a novice as belonging to the same species as the brilliant-orange or red specimens, and a mistake might easily be made. Often, too, the bulbous scaly base is broken off in picking and even that characteristic is lost. Another feature usually present in the fly-amanita is the striations on the upper side of the cap near the margin.

This is one of the largest, handsomest, and most dangerous of our mushrooms.

greenish, sometimes even yellow, color. Occasionally a few small and irregular patches are found on the top of the cap, consisting of fragments of the upper portion of the cup, which became attached to the top of the mushroom when it was very young and just pushing itself out of the ground. The presence of the cup which this species possesses, in common with other supposedly poisonous, is especially characteristic. It is usually situated well beneath the surface of the ground and should be carefully dug out when one is securing specimens for identification. Specimens occur, however, in which the inner surface of the cup is attached throughout to the stem, so that

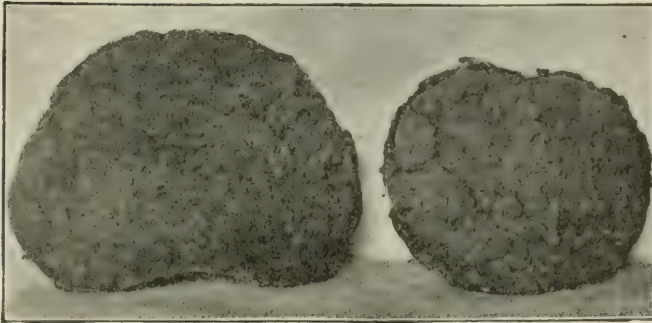


Fig. 9.—Puffball (*Lycoperdon cyathiforme*), viewed diagonally from above. One-half natural size. Not edible in this stage.



Fig. 10.—Fly-amanita (*Amanita muscaria*). Poisonous. One-half natural size.

it presents the appearance, not of a cup, but of a mere bulbous base.

The death-cup is a species not so abundant in the vicinity of Washington, yet of rather frequent occurrence in rich oak-woods. At Takoma Park it occurs in abundance. F. V. Coville (Circular No. 13, Division of Botany, U. S. Dept. of Agriculture, '98).

Both the species of poisonous mushrooms described have, as noted by Mr. Coville, *white gills and white spores*, while all the edible gill-bearing species herein described, except *Coprinus comatus*, have gills of some other color. In *Coprinus comatus* the spores at maturity are black. Several species of mushrooms having both white gills and white spores being edible, however, Mr. Coville urges that a beginner should not pick them, as he might easily mistake an amanita for them.

A high color, a scaly or spotted surface, and tough or watery flesh are usually associated with poisonous properties. Toxic fungi, moreover, grow clustered on wet or shady ground, the edible, singly, in dry pastures.

Fungi which have a bitter or styptic taste, or which burn the fauces, as well as those which yield a pungent milk, those of livid color, and those which on being bruised assume various hues, ought to be avoided. It should be remembered, also, that all plants of this class readily undergo decomposition, and should therefore be eaten as fresh as possible. Editorial (Lancet, May 30, '91).

Symptoms of Muscarine Poisoning.—

The symptoms of poisoning from this alkaloid—that present in *Amanita muscaria*—are mainly of cerebral origin. After a period varying from half an hour to fifteen hours, giddiness is experienced, and nausea, with salivation, vomiting, cramps, diarrhoea, dimness of vision, and dyspnoea follow in quick succession. The stools sometimes contain fragments of the fungus. The patient appears drunk and excited, then drowsy. These symp-

toms are usually the precursors of convulsions, and are preceded by anuria. Cardiac action is weakened, and the pulse is slow and thread-like. The pupils, at first contracted, become dilated as death approaches. The reflexes are, in part or quite, abolished, and cold sweats appear. Respiration gradually becomes more difficult and stertorous and the pulse finally becomes imperceptible, and death occurs either in coma or in the midst of a convulsion.

In favorable cases the stupor is not of long duration, the respiration and pulse are more active, and all the symptoms mentioned gradually disappear. In unfavorable cases the symptoms may progress rapidly or slowly, some cases dying a few hours after the first manifestation, others lasting two or three days.

Literature of '97-'98-'99.

Six cases of poisoning by the *Agaricus muscarius*. The six cases all occurred in one family and three were fatal. The mushrooms were eaten at about six in the evening. The first symptoms appeared in all the cases during the forenoon of the following day, and took the form of vomiting and diarrhoea. In most of the cases these symptoms were slight. All felt dull and stupid on awakening, and there was a feeling of dyspnoea which led them to seek the fresh air. One patient, a child, died during the evening of this day with convulsions. The two others who died (also children) showed no serious symptoms until the morning of the second day. At this time there was mental dullness, increasing to stupor, rapid, empty pulse; contracted pupils, irresponsive to light; rapid respiration, suppression of urine, and free perspiration.

One died on the first, one on the second, and one on the third day after the poisonous meal. The fatal dose in all of these cases was but a small one—in two cases but $\frac{1}{2}$ of a medium-sized mushroom, and in the third case but $\frac{1}{8}$. The members of the family who escaped ate



Fig. 11.—Fly-amanita (*Amanita muscaria*), top-view. Poisonous. Two-fifths natural size.

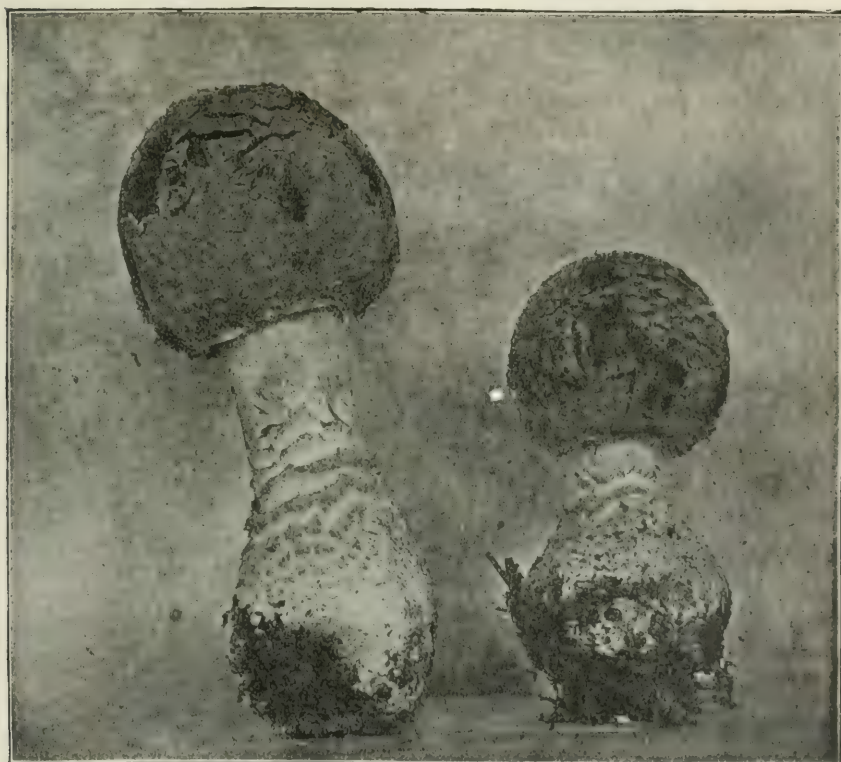


Fig. 12.—Fly-amanita (*Amanita muscaria*) buttons. Poisonous. Natural size.

as much or more of the mushrooms, and it is supposed that there were but one or two poisonous fungi in the dish; that those who died ate these, while the others ate good mushrooms that were rendered somewhat poisonous by being cooked together with the bad. G. E. Caglieri (Med. Rec., Aug. 28, '97).

In case of rapid recovery the stupor is short and usually marked with mild delirium. In fatal cases the stupor continues from one to two or three days and death at last ensues from the gradual weakening and final stoppage of the heart's action. V. K. Chestnut (Circ. No. 13, Division of Botany, U. S. Dept. of Agriculture, '98).

PHYSIOLOGICAL ACTION.—According to D. W. Prentiss, muscarine first produces increased excitability of the brain, and later reduced excitability, merging, in cases of poisoning, into paralysis of the brain-cells. The action on the heart is similar to that upon the brain-centres: first, increased frequency, followed by slow, feeble pulse. The action upon man and the lower animals is identical. In the latter, poisoning by muscarine is followed by stoppage of the heart,—in relaxation or diastole due to paralysis of the inhibitory nerve. Application of muscarine to the heart-muscle produces the same effect. This condition is relieved and the heart again begins to beat upon the administration of atropine.

Literature of '97-'98-'99.

Experiments on animals poisoned by the fly-amanita and with pure muscarine show very clearly that when the heart has nearly ceased to beat it may be stimulated to strong action almost constantly by the use of atropine. In such cases of poisoning its use should be pushed as heroically as the symptoms of the case will warrant. V. K. Chestnut (Circ. No. 13, Division of Botany, U. S. Dept. of Agriculture, '98)..

Treatment of Muscarine Poisoning.—

The patient should be kept in the recumbent position and as quiet as prac-

ticable, and the gastro-intestinal tract relieved at the earliest possible moment. The emetic to be employed should be selected so as to avoid depression, heart-failure being the chief danger, while the purgative should not be of a kind capable of encouraging, by the copious production of fluid, the absorption of the toxin. Thus, tartar emetic and salines become dangerous agents.

A tablespoonful of mustard in a tumblerful of lukewarm water usually acts promptly and may be administered if apomorphine is not at hand and while it is sent for. Unless copious emesis be obtained, the latter emetic ($\frac{1}{16}$ grain) should be administered hypodermically. Sulphate of zinc is also effective.

As purgative, an oleaginous agent is to be preferred. Croton-oil, 1 drop, may be given, or if there is not much general torpor, a tablespoonful of castor-oil. Half an ounce of glycerin, in as much water, injected into the rectum sometimes produces a rapid evacuation.

Atropine being the physiological antidote of muscarine, it should be given at once hypodermically, the dose ranging from $\frac{1}{120}$ grain to $\frac{1}{60}$ grain, according to age. The pupil acts as a reliable guide if the case is not seen too late; the atropine causes dilatation of the pin-head pupil as soon as its physiological effects are produced.

To further sustain cardiac action, digitalis is given at fixed intervals, strychnine or nitroglycerin, and all the methods applicable in chloroform narcosis are indicated. The poisonous action reaches its crisis, then gradually recedes. The aim, therefore, should be to maintain life by sustaining the action of the heart throughout the dangerous period.

Strychnine used as an antidote in mushroom poisoning, twelve injections



Fig. 13.—Fly-amanita (*Amanita muscaria*), partly expanded. Poisonous. Three-fourths natural size.



Fig. 14.—Death-cup (*Amanita phalloides*). Poisonous. Two-thirds natural size.

of $\frac{1}{64}$ grain each causing complete recovery. Koenigsdorfer (Pharm. Zeit. f. Russland, No. 7, '94).

Literature of '97-'98-'99.

First of all in importance is absolute rest in the recumbent posture; then the tincture of digitalis, 10 drops, should be given every two or three hours, according to the effect. If there should be blanched skin, pale face, and cold extremities, nitroglycerin, $\frac{1}{60}$ grain, should be given hypodermically as frequently as required, instead of the digitalis. If the heart still continues weak and the vital powers are sinking, galvanism to the cardiac region and inhalations of oxygen may be employed. Efforts to keep the patient alive should be unremitting; if the crisis can be tided over, nature will eliminate the poison and recovery be assured. For nourishment, concentrated foods are preferable, such as the meat-extracts, egg-albumin, milk, and the like. Nourishment is best given in small quantity at frequent intervals. D. W. Prentiss (Phila. Med. Jour., Sept. 24, '98).

The physiological antidote of muscarine is atropine, which should be given in full dose, say $\frac{1}{60}$ grain, and repeated if the pupils are not dilated by the first dose. With this should be given strychnine and such other stimulants and heart-tonics as are usual in the treatment of poisoning by depressants. Editorial (Northwestern Lancet, Jan. 1, '98).

Symptoms of Phalline Poisoning.—

Instead of acting on the heart as does muscarine, phalline—the toxic agent of the “death-cup”—tends to dissolve the blood-corpuscles, thus bringing about a condition simulating cholera. Severe cramps in the abdomen and lower limbs, particularly, come on a few hours after ingestion of the fungus. Violent diarrhoea, the stools becoming choleraic,—rice-water stools,—vomiting, algidity, collapse, cyanosis, muscular contraction, and convulsions sometimes follow one another in more or less rapid succession: a series of symptoms differing entirely

from muscarine poisoning. The symptoms increase in intensity without the mental hebetude and torpor witnessed in the latter, though, when death is approached in from two to four days, increasing somnolence, due to carbonic-acid poisoning, may be witnessed. The prognosis is far less favorable than in muscarine poisoning.

Treatment of Phalline Poisoning.—

Unless free vomiting and diarrhoea have already relieved the stomach and intestines of what portion of the fungus may remain, the same precautionary measures in this particular should be resorted to as in muscarine poisoning.

Unfortunately, there is no known antidote for phalline, but, common salt acting as a solvent, intravenous injections of normal salt solution (7 parts of common salt to 1000 parts of water) might be tried. Transfusion of blood might also prove of value.

The patient is not out of danger for some days even after alleviation of the most active symptoms. He should, therefore, be closely watched and his strength sustained, as indicated under the previous heading.

Literature of '97-'98-'99.

If the amount of phalline already taken up by the system is not too large, it may wear itself out on the blood, and the patient may recover. It is suggested that this wearing-out process may be assisted by transfusing into the veins blood freshly taken from some warm-blooded animal. The depletion of the blood-serum might be remedied by similar transfusions of salt and warm water. Chestnut (Circ. No. 13, Division of Botany, U. S. Dept. of Agriculture, '98).

Serum-therapy applied to mushroom poisoning. The guinea-pig and especially the rabbit are very susceptible to phalline. In these two animals the poison is inactive when taken by the mouth, but kills in minute doses when introduced

intravenously or subcutaneously. Tolerance was easily established. Having regard to the weight of the animal, it can quickly be brought to sustain very large doses. Claisse (*Gaz. Hebdom. de Méd. et de Chir.*, June 23, '98).

TRACHEITIS. See BRONCHITIS.

TRACHEO-LARYNGEAL OPERATIONS.

Thyrotomy.—Thyrotomy is calculated to expose freely the interior of the larynx for the removal of foreign bodies and tumors. To admit air into the respiratory tract, however, in diphtheria, laryngeal oedema, etc., it is not satisfactory, as a rule, being too close to the lesion for the relief of which it is practiced. When a foreign body is impacted above the vocal cords and cannot be removed from above, it not only facilitates breathing, but also the removal of the offending mass. Tumors of the larynx, when situated within the larynx proper, are brought within easy access, and may be thoroughly scraped off.

The operation consists in a vertical incision through the skin in the median line and splitting of the thyroid cartilage underneath. Care should be taken to open the latter at the junction of the two *alæ*. A sharp and strong bistoury is required. In some cases the cartilage is ossified and a fine saw must be employed. The operation is comparatively bloodless.

There is always danger of impairing the voice, and it is advisable to close the wound as early as possible. Some operators, when the larynx has been cleared of tumors, and when air must be artificially admitted into the trachea, extend the incision, performing a laryngo-tracheotomy in addition to the thyrotomy, close up the thyroid wound, and insert the tube below.

Laryngotomy.—In case of emergency—*i.e.*, when through the presence of a foreign body, an injury, oedema, etc., air must artificially be admitted into the larynx—this operation is very satisfactory. It consists in an incision through the cricothyroid membrane, in the median line from the thyroid cartilage down to the first tracheal ring. After incising the skin and on reaching the cricothyroid membrane beneath, an artery—the cricothyroid—is met with; this should be pushed aside and the membrane incised perpendicularly. In doing this care should be taken to penetrate the tracheal mucous membrane, which tends to become detached and sacculated, thus blocking the trachea. A small tracheotomy-tube should be used, and removed as early as practicable, necrosis of the cricoid or thyroid cartilages being otherwise likely.

Laryngo-tracheotomy.—When in laryngotomy the operation is extended so as to include the cricoid cartilage and the first ring of the trachea—not lower, lest the isthmus of the thyroid body be encountered—the procedure becomes a *laryngo-tracheotomy*. When the patient is on the verge of asphyxia, technical nicety must sometimes be sacrificed to the urgency of the case. The trachea must immediately be opened whether hæmorrhage be feared or not, by a perpendicular incision in the skin and one a little shorter through the walls of the trachea. If nothing but a pen-knife is at hand, this may be used when cleansed, and two hair-pins bent flatwise into letters S may be employed as hooks to keep the wound gaping while the patient's respiration becomes normal. Before incising the skin, however, it is always well to trace lightly, with a soft pencil, the site of the incision: *i.e.*, the middle line. If this precaution is neglected, the in-

cision is almost always irregular; indeed, the knife may not enter the trachea at all, but suddenly plunge to one side of it. When the outline of the incision is drawn, the skin should be held firmly down in its proper place with the thumb and middle finger of the left hand, while the right does the cutting. The isthmus of the thyroid should be avoided if possible, but this is often difficult, owing to the short distance between it and the cricoid cartilage above.

Tracheotomy.—The various conditions in which this operation is indicated may be divided into three classes: 1. Those in which a morbid process suddenly or gradually reduces the laryngeal lumen and involves the probability of asphyxia, such as diphtheria, croup, oedema, paralysis, malignant disease, etc. 2. Those in which physiological rest tends to reduce the activity of the morbid process and delay its progress, such as laryngeal tuberculosis and syphilis. 3. Those in which an impacted foreign body cannot be removed through the glottis.

This operation, though apparently easy, is by no means so in the first class of cases mentioned, owing to rapid perpendicular motions of the trachea when violent efforts at respiration are made. In the second class there is, as a rule, no dyspnœa; hence the operation, in a thin subject especially, is less difficult, since the trachea is quiescent except when the patient swallows. The same may be said of the majority of cases included under the third class.

It is not always possible to anæsthetize fully the patient when a stenotic disorder so compromises the respiration as to render expiration difficult, as is the case in tumors situated beneath the vocal cords; the residual air becomes so saturated with the anæsthetic that dangerous symptoms may appear if the agent used

be pushed. A small amount of ether under such circumstances usually suffices to dull sensation, this being further assisted by the imperfect oxygenation occurring as a result of improper breathing.

The operation is performed as follows: The patient is placed on a table and the shoulders are raised on a pillow so as to cause extension of the neck. With a blue pencil, a line starting from the cricoid five to seven centimetres downward, exactly in median line, is drawn—the tracing for the incision. This should include the skin and platysma. Blood-vessels should now be watched for, and, if any are met with, they should be tied if at all important, or pushed aside if possible. Working down, cutting only on the grooved director, and strictly following the axis of the trachea, the rings are soon reached. If the vessels have received proper attention, the wound should be comparatively dry. The tenaculum is then used to steady the trachea, and, an assistant holding the lips of the wound apart with hooks, the three rings, including the cricoid, are cut, if need be. A violent inspiration then occurs, followed by the sudden expulsion of mucus, blood, or diphtheritic membrane if any be present: a dangerous feature for the surgeon if he is not on his guard. At this time, the patient often ceases to breathe for several seconds. Though he practically always recovers, the opening should be carefully examined lest a mass of membrane, a plug of muco-pus, or a foreign body be the cause of the arrest of breathing. If it is prolonged, artificial breathing should be resorted to, or the patient should be slapped on the back and suspended by the heels. Finally, as a rule, the patient takes a deep breath and the respiration continues normal. The cannula is immediately introduced,

the sponges being taken off at the same time. The flow of blood ceases almost immediately upon the restoration of the normal breathing; for prudence's sake, however, the patient should be raised and leaned forward, so as to cause what blood might ooze from the wound to flow externally, instead of in the trachea. When the operation has been satisfactorily performed, the external wound above and below the tube is closed by adhesive strips, taking care to approximate and adjust the edges accurately. The lower end of the wound should remain open for drainage.

Keen introduces a silk suture into the trachea on each side of the incision and through the skin, ties the ends, and leaves them hanging long. This provides a permanent retractor with which the surgeon can at any time open the trachea. If no tracheotomy-tube is at hand, an elastic band tied around the neck can be used to connect the free ends of the ligatures, and so keep the trachea patent for free respiration.

Silver-tubes are to be preferred when the instrument is to be worn a long time; aluminium tubes are the best when they are to be removed soon, since the metal is corroded by the secretions. The hard-rubber tubes are clumsy and become quickly saturated and foul. A double tube—the largest that can be easily accommodated—should always be employed. It should also be carefully tied with tapes, around the neck, particularly in children.

During the operation, and as long as the patient is confined to his room, generally about a week, the atmosphere should be kept at a temperature of not less than 80° F., and maintained in a moist state by means of steam, obtained by boiling water in the apartment. In short, the object should be to furnish

the lungs with air possessing as nearly as possible the properties it would possess if it were inhaled through the nose. To further attain this object, the foreign particles floating in the atmosphere can be arrested at the mouth of the cannula by straddling a piece of thin muslin over it; care should be taken, however, not to attach it so as to interfere with the free discharge of mucus. The best means is to tie a thin muslin handkerchief around the neck above the cannula, letting it overhang its orifice. This not only prevents the ingress of dust during inspiration, but also serves to prevent the regurgitation of mucus, which often takes place without such a contrivance, when a coughing-spell forces the discharges up to the mouth of the tube.

An important point is to keep the cannula as free as possible from the copious discharges which are formed for a couple of days after the operation. An intelligent attendant should be carefully instructed to withdraw the inner cannula every two hours, to cleanse it carefully with hot water, then to reintroduce it into the outer tube after having effectively freed the cavity of the latter of any mucus that might have accumulated there. This may be done by means of a feather, a piece of sponge, or absorbent cotton securely and tightly fastened to a suitably bent piece of thin, brass wire.

The patient should be provided with two complete cannulas so as to occasionally be able to withdraw the outer tube also and cleanse it thoroughly. This can be done after a couple of days, the wound having had time to assume the shape of the outer cannula, thus enabling it to remain patulous for a short time after the instrument has been withdrawn complete. The extra cannula, previously warmed to avoid exciting cough, should be introduced immediately upon the

withdrawal of the other, using, to assist its entrance, a Cohen pilot. This instrument, introduced into the outer cannula, presents a blunt-pointed knob which separates what tissues might impede the progress of the latter. It should, of course, be instantly withdrawn as soon as the tube is in position. The occasional (once or twice a week after the first few days) withdrawal of the tubes serves also to avoid what danger the corrosion of a metallic cannula might incur. Cases have been reported in which pieces of such a cannula, broken off at an eroded point, occasioned alarming symptoms.

Occasionally, granulations are formed at the external tracheal orifice, and in the trachea itself, the latter being especially the case when a fenestrated tube is employed. Strong astringent solutions sometimes suffice to destroy them; in some cases, however, surgical measures are necessary.

When the cannula is to be withdrawn permanently, the natural breathing powers of the patient should be tested by closing the aperture of the cannula with a stopper. If this is borne without difficulty, the instrument may be withdrawn, but kept within easy reach, with pilot in position, for sudden replacing if necessary. As a rule, however, this is not required, and the wound closes up after a few days to finally heal completely a week or two later.

The cannula has occasionally to be worn permanently, the patient, to speak, being obliged to place his finger upon the external opening. In this case, Luer's tracheotomy-tube, the inner cannula of which contains a silver pea, whose object is to arrest the expired current of air, so as to enable it to pass between the vocal bands, will be found very

useful, rendering the use of the finger to close the tube unnecessary.

CHARLES E. DE M. SAJOUS,
Philadelphia.

TREMORS.

Paralysis Agitans (Parkinson's Disease).

Definition.—An affection characterized by a special form of tremor, muscular rigidity, and attended with paralysis.

Symptoms.—The tremor of paralysis agitans possesses characteristics that are not observed in other forms. As a rule, it appears insidiously, though it may appear suddenly after a fright, a violent emotion, or a traumatism. It affects first the hand, the thumb, or the foot, but it is so slight that the patient hardly perceives it. It then disappears, and soon reappears with more or less increase in the area involved, and sometimes accompanied by hemiplegia and paraplegia. The peculiarity of the tremor is mainly due to the position assumed by the extremity affected. The fingers, for instance, assume the position required to hold a pen, the four straightened fingers united at their tips, tremble simultaneously, while the thumb oscillates rapidly and synchronously in their direction. These movements occur while the muscles are at rest, but cease when the patient is asleep. Under the influence of the will their intensity may be reduced to a certain extent. The arms, legs, feet, and head may take part in the tremor, although the motion of the latter is mainly communicated to it by that of the extremities. Localized sweating is sometimes observed.

The muscular rigidity is a special feature of paralysis agitans. It begins by painful cramps which, though temporary at first, finally become permanent. Under the influence of this rigidity, the

head, trunk, and the limbs assume special positions. The head may remain fixed in position, the eyes become fixed, and the features expressionless.

Later on, the muscular rigidity causes the thighs to become rapidly raised toward the abdomen, but there is no true contracture nor the epileptoid tremor of lateral sclerosis. The hands through muscular rigidity may become deformed. Besides the cramps already alluded to, the patient complains of a sensation of excessive heat, showing thermometrically an excess of 6° F. in some cases (Gowers). In some instances tremor is absent. Later on a peculiar paresis termed the "paralytic period" appears, the tremor becoming reduced in proportion, and the patient enters a cachectic period during which disorders of nutrition occur. He gradually sinks into a marasmus, with diarrhœa, anasarca, incontinence of urine, and gradual reduction of mental powers. An intercurrent affection, especially pneumonia, usually closes the scene (Dieulafoy).

Etiology and Pathology.—Although paralysis agitans is a disease of middle or advanced age, it is occasionally observed in young subjects and more frequently in males than females. Anxiety, worryment, violent emotions, exposure, traumatisms involving a nerve, infectious fevers, and heredity are recognized as causative factors. The exact nature of the morbid lesions is as yet unknown.

Treatment.—The bromides in large doses have been recommended, but their value is problematical. Far more useful are hot baths at a temperature of 122° F.; cold affusions on the head and applications of ice to the region of the fissure of Rolando; and galvanic or electrostatic baths. Subcutaneous injections of a 4-per-cent. solution of sodium phosphate diminish the Parkinsonian trem-

bling, according to Liégeois. When the disease has evidently followed exposure to cold and wet, sodium salicylate or salol is recommended.

Tremor.

In an analysis of the pathogenesis of tremor based upon a study of the literature of the subject and clinical observation, Adamkiewicz (Berl. klin. Woch., Oct. 3, '98) reached the conclusion that tremor arose from disturbances in the equilibrium of the two spinal innervating stimuli. Two currents pass along the spinal cord to the ganglion-cells of the anterior horns from which the nerves for the muscles arise. One of these currents passes along the posterior columns, the other along the pyramidal tracts. The former arises in the cerebellum and keeps the muscles in a state of tension; the other originates in the cerebral cortex and conveys voluntary impulses to the muscles. When both currents are properly balanced, they act upon the muscles as a stimulus and as a check like whip and rein. If the excitation along the posterior columns is insufficient the muscles deprived of their check become unruly and produce ataxia. When, on the other hand, the muscles are controlled by the current along the posterior columns and the regulating action of the pyramidal tracts is absent, as, for example, in lateral sclerosis, the muscles of the lower extremities are in a state of excessive tension; so that the joints become immovable and the gait stiff, labored, and dragging. If the patient attempts to move, the hypertensioned muscles develop a state of tremor. In the beginning this tremor is slight, but in proportion as the tension of the muscles increases it becomes augmented, until finally a tremor-paroxysm develops. Various toxics,—lead, tobacco, opium, coffee, tea, cocaine, hasheesh, arsenic,

etc.,—hysteria, and old age are the main etiological factors in tremor. Dana has observed a family in which it was distinctly hereditary.

Literature of '97-'98-'99.

Conclusions based upon 1000 observations of tremor on more than 100 different persons: 1. All muscular movements are made up of a series of elementary contractions and relaxations in alternation, which may be appreciable as tremor in conditions of both health and disease. 2. The differences between different tremors are of degree rather than of kind: *i.e.*, no one form of tremor is distinctive of any one disease or group of diseases. 3. No definite relation exists between one form of tremor and any other. 4. The frequency of movement is in inverse ratio to the amplitude, and *vice versa*. 5. Habitual movements are performed with greater freedom from tremor than unusual movements. 6. There is no material difference between the movements of the two sides of the body, except as related to proposition No. 5. A. A. Eshner (Jour. of Exper. Med., May, '97).

TOXIC TREMOR.—This is a form of trembling due to the toxic influence of mercury, lead, copper, and arsenic, that induced by the latter drug being especially tenacious. Tobacco often induces tremor in elderly men.

Treatment.—In tremors due to the first three metals Liégeois recommends potassium bromide, 150 grains daily, during one month. It forms with the metal a soluble bromide which is easily voided by the urine. In arsenical tremor frictions and baths are alone effective.

ALCOHOLIC TREMOR.—The inability of the hands to hold anything, the paresis of the legs, with a dragging gait, the arrest of the tendinous reflexes, and the trembling which are seen in alcoholics, should be classed, according to Liégeois, with the trembling of paralysis.

Treatment.—Strychnine alone is not so efficacious as when it is associated with picrotoxin and with veratrine. Ten galvanic or electric baths give successful results in tremor potatorum. For this acute stage of chronic alcoholism, which is called delirium tremens, alcohol in doses of from 2 to 3 ounces is an excellent remedy. It induces sleep immediately and the patient awakens cured. (See **ALCOHOLISM**, volume i.)

SENILE TREMOR.—This form seldom appears before the age of seventy years, and is especially marked in the upper extremities, the hands in particular. In some cases the head also takes part, and transmits, by its rapid movements, rapid oscillations to the entire body. The movements are especially marked during muscular activity.

Nothing seems to give better results, according to Liégeois, for senile trembling of the limbs accompanied with a transverse or vertical tossing of the head, than an analeptic diet and river-bathing, if there are no contra-indications: an infusion of the flowering heads of *Chenopodium ambrosioides* may also be given in the proportion of from 2 to 2½ drachms to a pint of water.

TROPICAL FEVERS. See **SPECIFIC INFECTIOUS FEVERS**.

TUBERCULOSIS OF THE LARYNX.

Definition.—A tuberculous, primary or secondary, infiltration of the glandular elements and connective tissue of the larynx characterized by tumefaction and ulceration and giving rise to dysphagia, aphonia, and dyspnœa.

Symptoms.—Tuberculosis of the larynx is often present in cases of pulmonary tuberculosis, and, were all the latter systematically examined laryngoscop-

ically, lesions, so situated as to preclude active subjective symptoms, would be found in the majority of cases. Unless marked hoarseness, aphonia, or local pain be complained of, the larynx receives but little attention; were it otherwise, a greater degree of comfort could be afforded consumptives than they obtain when the pulmonary disorder is alone treated.

The larynx may become infected either through the lymphatics or directly through invasion of the laryngeal tissues proper by the bacillus of tuberculosis. Whether an erosion is necessary or not in the latter case is not established; it is believed, however, that such an erosion is necessary.

Slight hoarseness, short periods of aphonia,—a couple of seconds' duration at times,—a sensation of dryness, and local heat represent the early symptoms generally met with. If there is a pulmonary trouble, the symptoms of the latter, especially the cough, cause the laryngeal trouble to be attributed to it. After a period varying in length, the local pain is increased by deglutition, and sometimes radiates to the ears. The hoarseness is now apt to become aggravated or the voice may be completely lost.

Cough is not severe, as a rule; but it is peculiar, being usually husky and lacking in resonance. The general health may continue to be good as far as active constitutional symptoms are concerned, until the distress during deglutition becomes such as to cause the patient to reduce the amount of food he takes to avoid the pain the act involves. Indeed, the dysphagia is such sometimes as to render the taking of any food a source of dread to the patient, and constitutes the most marked of all the symptoms. It is especially severe when the

epiglottis is the seat of the tuberculous ulceration or when the pharynx is affected. In fatal cases it is apt to persist and to become steadily aggravated. The pulse, temperature, and other general symptoms are those of pulmonary phthisis, but emaciation progresses more rapidly than in the latter disease, the pain during deglutition causing the patient to abstain from food as much as possible.

Examination of the larynx during the early stages usually reveals a characteristic feature: a pale-yellowish tinge, which sometimes reaches to absolute pallor. In the majority of cases a typical sign also appears: a pyriform swelling, or "clubbing," of the arytenoids, which causes these prominences to resemble small cushions if they are both enlarged, which is not always the case. In some instances, however, the larynx may be as red as usual, and even appear congested. After a short time, grayish superficial erosions may be detected, which, after awhile, become deeper and sharp-edged, and are surrounded by a narrow, red areola. A thick, tenacious secretion usually collects over them which can only be removed with difficulty. The morbid process then extends in various directions until almost any part of the larynx and neighboring tissue is involved in the general trouble. Various excrescences or tumors may appear, so situated, sometimes, as to compromise the laryngeal aperture.

Diagnosis.—The pallor of the mucous membrane, especially marked posteriorly, the club-shaped masses over the cartilages of Wrisberg and Santorini, and, in a large proportion of cases, the turban-like epiglottis give the larynx a characteristic appearance when the local process is at all active. The ulcers are more superficial than those of a syphilitic

larynx, and appear grayish rather than yellow, as is the latter disease. The syphilitic ulcer is "punched out," with perpendicular and crenelated edges, and the areola is dark in hue. The cancerous ulcer tends to be raised by underlying accumulation of morbid elements, and is totally devoid of the pallor peculiar to tuberculosis. The pain is usually most acute during deglutition in tuberculosis, during phonation in syphilis, and constant in cancer.

Prognosis.—Spontaneous cure of the slight tubercular ulcers occasionally occurs (14 cases out of 3000, Heryng), but the normal tendency of a tubercular process in the larynx is toward aggravation. When the epiglottis is affected the chances of recovery are very slight. These are improved materially, however, if the patient can be removed to a mild and warm climate and when the general health can, by suitable dietetic means, out-of-door life, and the judicious use of creasote, be favorably influenced.

Treatment.—The treatment of tuberculosis of the larynx should be local and general. The indications for the general measures will be thoroughly reviewed in the next article, and are *invariably* applicable when the larynx is diseased, whether primarily or secondarily.

Thorough cleansing of the laryngeal surfaces is an important feature of the treatment. This can be done most satisfactorily with a lukewarm solution of borate of sodium and bicarbonate of sodium, 10 grains of each to the ounce of water, using an atomizer, or the familiar Dobell's solution. Care should be taken to relieve the surfaces of all purulent discharges, and thus prepare them for remedial agents. If this cannot be done daily by the attending physician, some person in the immediate surroundings of the patient should be

carefully instructed; but under such circumstances the cleansing process had better be resorted to night and morning. As a local application Elsberg's saturated solution of iodoform in ether has stood the test of time; it must be applied with the laryngeal forceps, a cotton wad being used. For the patient's home use, a solution of menthol, 20 grains to the ounce of benzoinol,—an excellent agent for the purpose,—will not only relieve the suffering, but greatly assist the curative process.

More active measures are resorted to by specialists, and lactic acid may be said to hold the first position in this direction. A 50-per-cent. solution, well rubbed into the ulcerated tissues after they have been thoroughly anæsthetized with a 20-per-cent. solution of cocaine every three days, is often productive of excellent results, but only in cases in which the local lesion is limited in extent. This treatment is greatly facilitated by the continued use of orthoform either in powder or, as advised by Kassel (*Ther. Monats.*, No. 10, '98), in the form of an emulsion containing orthoform, 25 parts; olive-oil, 100 parts. The burning sensation lasts only about a quarter of an hour, and is then succeeded by anæsthesia, which commonly lasts from twenty-four hours to three and a half days. The patient is able to eat all kinds of food, and the appetite is greatly increased. A distinct diminution in the amount of secretion in cases of ulceration is noted, but otherwise it does not appear to have any local therapeutic value. Patients do not dread the lactic-acid treatment if orthoform emulsion is used regularly.

Literature of '97-'98-'99.

Observations extending over a period of three to nine months, on the hypodermic administration on alternate days,

in 10-minim doses gradually increased to 20, of antitubercle horse-serum prepared at the Biochemical Laboratory, Washington, D. C., for the United States Government, show of laryngeal ulcerations healed, 8 cases; laryngeal ulcerations improved, 2 cases; laryngeal ulcerations unimproved, 2 cases; laryngeal thickenings improved, 7 cases. Subjective symptoms also showed marked improvement, the voice returning, cough subsiding, and pain ameliorating. Walter F. Chappell (*N. Y. Med. Jour.*, Sept. 10, '98).

In phthisical laryngitis, by insufflating a small quantity of orthoform in the throat, the patient is able to take food in comparative comfort for two days after each application. William Cheatham (*Amer. Therap.*, Feb., '99).

The curette may be used to advantage when too much tissue is not involved in the tuberculous process. It should be limited, however, to primary and incipient cases, and to cases in which the pulmonary lesions are very limited in area. Under such circumstances the chances of success are quite fair. Unfortunately the procedure requires a degree of dexterity which an experienced specialist alone can possess, even with the assistance of a 20-per-cent. solution of cocaine, which facilitates the operation and renders it comparatively painless. Her yng's or Krause's curette may be used, the operation being watched in the laryngoscopic mirror. Cicatrization is usually complete in three or four weeks, and considerable relief is afforded if cure is not obtained. The application of a 50-per-cent. lactic acid to the curetted spot serves to increase the efficiency of the treatment. Unless it can be carried out thoroughly, however, it had better not be resorted to.

Literature of '97-'98-'99.

In laryngeal tuberculosis curettage is indicated: 1. In cases of primary tuberculosis without pulmonary complications.

2. In circumscribed ulcerations and infiltrations. 3. In hard infiltrations of arytenoid region of posterior wall, ventricular bands, and tuberculous tumors of the epiglottis. 4. In incipient stage of pulmonary disease with but little fever and hectic. 5. In advanced pulmonary disease with distressing dysphagia. The contra-indications are: 1. Advanced pulmonary disease and hectic. 2. Disseminated tuberculosis of the larynx. 3. Extensive infiltrations causing severe stenosis where tracheotomy is indicated. 4. In the timid, distrustful, with little nerve-power. J. W. Gleitsman (*N. Y. Med. Jour.*, Jan., '98).

Among the more severe surgical measures at the disposal of the physician, enucleation of the diseased area with sharp forceps may be advantageous when the infiltration is limited to a location, such as the arytenoid prominences, which may readily be grasped. Thyrotomy enables the surgeon to reach all parts of the larynx from the outside and to curette thoroughly any diseased surface. This should not be resorted to, however, when the disease is far advanced. Tracheotomy is sometimes resorted to, to give complete rest to the larynx or when dyspnoea becomes a source of suffering or threatens to become aggravated.

An important feature of the treatment is to enable the patient to nourish himself properly. Unfortunately the dysphagia is always the most marked symptom, and the sufferings of the patient are sometimes excruciating. The most satisfactory method is to apply a 4-per-cent. cocaine solution with the atomizer about 5 minutes before each meal, to the larynx, thoroughly bathing all its surfaces, and to alternate this every week with orthoform powder. The patient does not, in this manner, become habituated to either drug, and the beneficial effects of each are preserved.

Much of the suffering may be avoided

in the later stages if, as suggested by Wolfenden, the patient will lie on his stomach on a bed and suck up liquid food through a tube from a receptacle placed on the floor. The food thus tends to enter the œsophagus through the pyriform sinuses on each side of the larynx, and to avoid contact with the latter.

Literature of '97-'98-'99.

Formaldehyde is an excellent remedy in tubercular laryngitis. The treatment is begun with solutions of from $\frac{1}{2}$ to 1 per cent., and gradually increased until a strength of 10 per cent. is applied. When strong solutions are used the larynx should be cocaineized before their application. Weak solutions of a single drop of liquid formaldehyde in an ounce of water have an anæsthetic power that produces exceedingly gratifying results when used as a gargle or spray in advanced cases, where swallowing is painful. The use of such solutions enables the patient to avoid the discomfort and the use of cocaine. T. J. Gallagher (*Jour. Amer. Med. Assoc.*, xxxii, p. 476, '99).

CHARLES E. DE M. SAJOUS,
Philadelphia.

TUBERCULOSIS OF THE LUNGS.

Definition.—Pulmonary tuberculosis, phthisis, or consumption, is a specific inflammation of pulmonary tissue caused by the inception of the tubercle bacillus. Small nodules are scattered, more or less profusely, throughout the diseased areas, and cause certain pathological changes, such as infiltration, caseation, fibrosis, calcification, and ulceration.

There are three stages of this disease which may be recognized either pathologically or clinically, viz.: incipient, moderately advanced, and far advanced. There are also two varieties: the acute and chronic.

Etiology.—Prior to 1882 this disease was supposed to be hereditary, and little

was known of its contagious character. In that year Koch revolutionized the accepted views of its etiology by demonstrating the tubercle bacillus. This bacillus is one of the most prevalent of the known infectious germs. It attacks mostly the warm-blooded animals, being a common invader of fowls, pigs, cows, and other domestic animals; the horse is only slightly susceptible to infection. Some warm-blooded animals, notably the guinea-pig, while comparatively immune to infection, are very susceptible to inoculation.

Among the human race the disease is very easily contracted, and is the most wide-spread and fatal one to which man is heir. Its ravages are especially apparent in large cities and towns.

Longitude and latitude have but slight influence upon its prevalence, but altitude seems to exert a more or less controlling influence upon the life of the germ. Foul air, overcrowding, lack of sunshine, dampness, combined with low altitude and unsanitary conditions generally, are all potent factors in the propagation of the disease. Direct contagion from kissing is possible, and the inception of the germ may possibly occur through using the same eating and drinking utensils without careful sterilization.

Infection by tuberculous meat eaten in a partially raw condition has been frequently demonstrated, as well as the danger of infection by tainted milk. The latter is not an infrequent source of infection, and by many observers is accountable for the prevalence of intestinal and mesenteric tuberculosis in children.

Primary tuberculosis in a very large majority of cases begins in the lungs, and it is assumed that such cases are due to the inhalation of the bacillus in dried

sputum in the form of dust. It is claimed by some writers that prolonged exposure to the exhalations of tuberculars in close rooms, as in crowded tenements, is often followed by the development of the disease. However, before this can be satisfactorily demonstrated, the very potent concomitants of unsanitary environment, constitutional dyscrasia, and the lack of care in the disposal of infected sputa must be eliminated. After the crusade of 1896-97, inaugurated by the New York Health Board, it was shown that secondary cases in given tenements or flats occurred *in exact proportion to the intelligence and honesty displayed by the occupants in carrying out the prescribed rules for the disposal of sputa.*

The bacillus may also be transmitted by a tubercular coughing directly at the face of a healthy person. Another method of transmitting the germ is the use of the "sanitary spit-cloths," which are subsequently burned with the secretions which remain on them, no notice being taken of the pockets and the clothes constantly smeared by the misnamed sanitary cloths wet with infected sputa.

Heredity as a causal factor of pulmonary tuberculosis is to be noted only as a predisposing physical deformity which is inherited. This departure from the normal may be noted in a general lack of resisting power to disease, especially a proneness to attacks of bronchitis; strumous conditions during childhood; abnormally narrow chests in a flat thorax and lack of expansion of the upper lobes of the lungs. A very significant indication of predisposition to pulmonary tuberculosis is a constantly present tachycardia. Certain forms of anæmia are also etiological factors in the inception of this disease; poor food and

prolonged lactation; employment in certain trades, such as knife-grinding and polishing; silk works, and mines are also to be noted among the general sources of pulmonary tuberculosis. Among other immediately predisposing factors may be mentioned pneumonia, influenza, bronchitis, pleurisy, syphilis, diabetes, and scarlatina.

Other methods of infection are by direct inoculation, such as occurs in experimental work upon guinea-pigs, and accidentally in those who handle tubercular meat or infected tissues; in post-mortem work, the verruca necrogenica, a local tubercular process, is commonly seen upon the hands of those preparing autopsies and close contact, such as occurs between man and wife. In the performance of the rite of circumcision there is a well-known instance of direct inoculability, where a diseased operator communicated tuberculosis to several infants by the practice of suction. Wherever infective material comes in contact with an abraded surface or where tissues are directly exposed to its action, local infection may occur. This is commonly seen in the tubercular nature of the lining membrane of sinuses and tracts leading from foci.

One of the most common predisposing factors to the successful inroads of the tubercle bacillus in the lung is a diseased condition of the upper air-passages. Perhaps the most powerful of these is bad nasal ventilation, such as may be caused by adenomata, nasal spurs, etc., which induce the patient to breathe through the mouth.

Finally, it is to be noted that, while the bacillus of Koch is the specific agent necessary for the development of pulmonary tuberculosis, one or more of the general and direct predisposing causes before mentioned must have prepared a

suitable soil for the bacillus to become inimical to the patient.

Hereditary tuberculosis is seen only in infants or very young children, and its methods of transmission, presumably *in utero*, will be considered later.

BACTERIOLOGY.—The etiological factor of tuberculosis, the bacillus of Koch, is a non-motile, parasitic aerobic and facultative aerobic rod-shaped organism two to four microns in length, or about half that of a red blood-corpuscle, and two-tenths micron in diameter, having—as one of its most characteristic features which distinguishes it from all other bacteria known, with the exception of the bacillus of leprosy which it closely resembles—the ability to retain the stain of the alkaline solutions of the aniline dyes after treatment with acids. This bacillus is found in all tubercular lesions, and shows a marked tendency to arrange itself in V-shaped pairs. It is frequently bent or slightly curved, and presents, when stained, small, rounded, or oval, clear, bright spaces,—three, four, or five to each bacillus,—which, failing to take the stain, give it the appearance of the streptococcus.

It fulfills Koch's circuit: it is found in this and in no other disease. It is capable of cultivation outside the body and of producing, when inoculations are made from these cultures, the original disease, in the lesion of which is found the bacillus. This circuit can be indefinitely prolonged, and the inoculation carried on through a series of animals always resulting in the production of tuberculosis.

It grows upon a variety of culture-media, such as bouillon, potato, and agar to which glycerin has been added, and at a temperature of about 37° C.; best upon blood-serum at a temperature of blood-heat in the presence of moisture

and small quantities of oxygen and in the absence of sunlight: conditions highly available in the living tissues of all mammalia, to which the disease usually restricts itself. On artificial media its growth is slow; about the beginning of the third week may be seen on the surface a thin, grayish-white layer, which fails to penetrate into its depth. It elaborates a toxin which is soluble in glycerin, and which produces, when injected into tubercular animals, a reaction accompanied by temperature; in healthy animals no such effect is obtained, and in consequence it becomes of diagnostic value.

Literature of '97-'98-'99.

The application of tuberculin to suspected cases will often throw much needed light upon them, enabling the physician to reach a positive conclusion, and will give the patient all the chances of recovery that lie in the detection of the disease at such an early stage, before extensive lesions have developed or secondary infection has occurred. E. L. Trudeau (Med. News, May 29, '97).

Conclusions summarizing the value of the tuberculin test in the diagnosis of tuberculosis are as follow: 1. The tuberculin test indicates early tuberculosis by a general reaction before it can be detected by other methods, except the x-ray, in the large majority of cases, with a dose of from 5 to 10 milligrammes of Koch's original tuberculin. 2. No injurious results occur from the use of tuberculin in these doses. 3. Proved tuberculosis in a more or less advanced stage may fail to give a general reaction from doses of from 10 to 12 milligrammes. 4. Syphilis gives a reaction in an undetermined proportion of cases. 5. There is a dose, undetermined, at which a non-tuberculous person may react or simulate a reaction. 6. The reaction may be deferred from six to twenty-four hours.

The rules to be observed in making the test are as follow: 1. The same tuberculin and of a standard strength should

always be used.* 2. Aseptic precautions in giving the injection should be used. 3. The injections should be made deep into the muscles of the back, arm, or leg. 4. A two-, three-, or four- hourly chart of the temperature should be kept if possible, beginning twenty-four hours before the injection. 5. Several days should be allowed to elapse before the test is repeated. 6. In early cases the general reaction should be depended upon; in late cases, if the general reaction failed, the local reaction should be carefully looked for. Edward O. Otis (Med. Rec., June 17, '99).

Number of bacilli in any specimen of sputum means little; it is common to see, in incipient cases, the microscopical field crowded, and these very cases fail to show at the time or in their subsequent history either clinically or by physical examination, any evidence of an active process. We believe that, to some extent, this is accounted for by the ability of the germ to multiply in the retained secretions, and that, so far as number is concerned, we are oftentimes observing the saprophytic tubercle bacillus which has germinated and passed its life-cycle in these secretions, instead of the invading bacillus which has made an inroad upon living lung-tissue and has been cast off. And in the same way, to some extent, the well-known clinical fact that bacilli are more apt to be found in the morning sputum than that occurring later in the day, is accounted for.

BACILLUS EXTERNAL TO LIVING TISSUES.—External to living tissues the conditions for the growth of the bacillus are extremely unfavorable: after an exposure to sunlight of from a few minutes to several hours, or to diffused daylight from five to seven days, its growth is retarded, its virulence modified, and it is usually destroyed. Direct sunlight is particularly fatal to this germ, and it is in this that we have the explanation of

the partial protection against the wholesale infection of rooms and localities frequented by phthisical patients; while the dust in the room of a tubercular individual may contain the germ and be capable of carrying the infection, the bacillus under such conditions remains in an inactive state, does not multiply, and gradually loses its virulence, but only awaits, during its slow destruction, a proper soil upon which to alight, and this not infrequently comes with the susceptible individual who cares for the sick and is constantly breathing a germ-carrying atmosphere. Dry sputum may retain for months its infectivity, but, as a rule, this is destroyed by its exposure to sunlight, and the disinfecting process is usually complete before the sputum has become sufficiently dried and pulverized to be air-borne.

HEREDITY.—There is no fact to substantiate the theory of direct transmission from the male through a germ-carrying spermatozoon. There is, however, experimental proof in animals that the female ovum may be the carrier, but whether this ever takes place in the human being is a question, and from a practical point may be cast aside.

Congenital tuberculosis, in the majority of instances, occurs from infection through the blood-current; either the bacilli lodge and grow in the placenta or, having passed this tissue, invade the foetal organs and blood; but, considering the prevalence of the disease, congenital tuberculosis may be regarded as one of the rarities in medicine. Children born of mothers who at the time of conception are far advanced in the tubercular process, seldom show at birth any sign of the disease, and inoculations of the foetal tissues into rabbits give negative results.

The commonly-accepted belief of the

laity is that the children of tubercular parents inherit directly from them the disease which, harbored for many years in a latent state, under suitable conditions becomes manifest. Heredity, in the vast majority of instances, means nothing more than the transmission from parent to offspring of tissue peculiarities, in accordance with that invariable tendency throughout the vegetable and animal kingdoms for each individual to exactly reproduce itself, not only in its form, size, function, and in its nature, but in its reaction to environment and in its ability to withstand or to be overcome by the action of various poisons and disease-producing germs; and this is true, not alone of individuals, but of organ and of cell; and it is this susceptibility of cell to invasion by the bacillus of tuberculosis, and not the disease itself, which has been inherited, just as children have the blue eyes of their mother or the black hair of their father, or the mental traits and physiognomy of either, which stamp them as a family, brothers and sisters of a common flesh and blood. The old expression that the patient has inherited "weak lungs" covers the ground, and with the proper soil which, under the influence of our civilized life, is kept tilled by the depressing influences of bad food, poor ventilation, and the like; these, with the wide distribution and prevalence of the germ, give at some time all susceptible individuals their opportunity to become infected, and, alas, how many take the chance!

INFECTION BY THE RESPIRATORY TRACT.—This is by far the most common route of infection, and to appreciate the polluted atmosphere that we ordinarily breathe it is only necessary to watch the dust in the path of a sunbeam admitted through a slit into a dark room.

Add to this the countless numbers of bacilli cast off in the expectorations of phthysical patients, and the negligence ordinarily observed in the care of sputum, and the explanation of the high mortality of this disease among the inmates and attendants of the large charity institutions of our cities is easily accounted for. The great source of danger is from pulverized sputum in the form of dust; and to prove this there is the fact that in the well-directed sanitariums of this country and Europe, where scrupulous scientific cleanliness is observed and particular attention is paid to the disinfection of sputum, infection of nurses or attendants, or those coming in intimate contact with the sick, is an extremely rare occurrence. It goes to show what degree of prophylaxis can be secured by intelligent handling. This is one of the great arguments in favor of sanitariums.

RACE: Among all the aboriginal peoples, when suddenly ushered into the midst of artificial life consequent upon civilization,—and the same may be said of animals which the ingenuity of man has succeeded in bringing into captivity,—the disease is terribly fatal; one has but to look upon the record the Indian has left behind him, or to go down among the slums of the great cities, and see its ravages upon the negro race; or to visit the menageries and ask "What limits the captivity of animals?" to see the vast destruction of this disease. In each instance it is the Great White Plague which stares him in the face: a veritable barrier to a sudden transition from a non-civilized into a civilized environment. So fatal is it to the black man of this country when living under the influence of city life that we believe this disease will play no little part in



Fig. 1 Fig. 7 Fig. 8 Fig. 9 Fig. 2 Fig. 5 Fig. 3, 4 Fig. 6, a



Gradual Metamorphosis of Parenchyma during Progressive Caseation
showing Destruction of Vascular Supply. (Leveillé.)

the solution of the race problem which confronts us.

Morbid Anatomy and Pathology.—Scattered throughout an infected area are found small, non-vascular, cellular masses—tubercles of different sizes, the result of tissue reaction upon the invading bacilli and their toxins. The tubercles are composed of various cellular elements and tubercle bacilli, the former being derived from multiplication of the fixed connective-tissue cells of the part, from the endothelium of the blood-vessels, and from leucocytes which have migrated in large numbers to the point of attack. There is sometimes seen in the centre of a tubercle an immense cell—the giant cell which frequently contains bacilli; its increased size is supposed to be due to an abortive effort at reproduction with resulting increase in size, owing to its failure of division.

As a result of nutritional failure, the centre of this mass which is farthest removed from nourishment, the whole being a tissue of a low degree of vitality, undergoes coagulation-necrosis; subsequent softening may occur, with breaking down; or the liquid portion may be absorbed and leave a caseous mass, which, in turn, may become impregnated with lime-salts giving a calcareous deposit, while the whole may be capsulated in a fibrous protecting envelope that the tissue-cells have thrown out to surround the focus of infection, thus making of it a foreign body (*see colored plate*). Should softening and ulceration into a bronchus take place, a cavity is formed, its size depending upon the extent of structure invaded. From the absorption of the toxins, the adjacent tissues to a tubercular process undergo inflammatory changes to greater or less degree, and in the lungs of phthisical

patients broncho-pneumonic areas are commonly found surrounding foci of infection.

As might be expected in a disease which may be either acute or chronic, localized or diffusely infiltrated throughout a tissue, the morbid anatomy presents a diversity of lesions, but underlying these varied conditions there is but one and the same pathological process. These naked-eye differences are dependent largely upon mechanical or physical conditions; upon location; the tissues involved; the rapidity of the process; the degree to which the tissue-cells have been able to throw out their protective barriers of fibrous tissue; and the subsequent behavior of that fibrous tissue, whether it contracts, which is its natural tendency, with resulting distortion or puckering of lung, or, if localized, with the formation of a scar or the obliteration of a bronchus, producing dilatations, or bronchiectasy; or whether it becomes diffuse throughout a lung or lobe, giving the picture of fibroid phthisis. Thus a tubercular cavity and a tubercular ulcer are one and the same thing, their only difference being in contour, and they both represent a tubercular nodule in its later stage, minus its broken-down and softened centre. The ulcer may be considered a cavity divided in half.

A consolidation is merely an aggregation of tubercles, or the tubercular process in which all the tissue of that area is involved with little or no normal structure sandwiched in between.

If these minute tubercular masses become scattered throughout the lung so that normal tissue-elements intervene, the picture of an infiltration presents itself. When the disease progresses, with consequent diminution of the normal adjacent structure, the process is spoken of

as passing from the stage of infiltration to that of consolidation. The pathological change is practically the same, the chief difference depending upon the amount of tissue involved, and whether the process be diffused or localized. True consolidation is considered a later stage of infiltration, because it is a degree nearer to the breaking-down process; but the chief reason for this breaking down is that the mere aggregation of these tubercles, these non-vascular, cellular bodies of low vitality, cuts off nutrition from the interior of its own mass, in consequence of which softening takes place. An infiltration shows no such tendency, because nourishment is derived from the intervening normal elements, sufficient to keep the area from undergoing destructive changes. The broncho-pneumonia of acute or galloping consumption may be considered a tubercular invasion similar to the rest, but lacking the picture of more definite arrangement into tubercles, because the process has been severe and sudden, and has brought forth more of the acute inflammatory products, and because the defensive tissue-cells have failed to arrange themselves in the usual order observed in the more chronic lesions. However, in following these cases of galloping consumption it is not uncommon to see the process limited, the picture assuming that of chronic ulcerative phthisis; which means that the tissues have reacted, and the invading broncho-pneumonic area has had thrown around it a protective layer or epithelioid cells, and a similar layer of leucocytes. In other words, a tubercle has been formed, which is Nature's effort at limitation, and her first step toward making of it a foreign body, her only method of cure, which in turn is accomplished by the fibrous capsule thrown out around it.

In chronic ulcerative phthisis there may be seen at the same time all kinds of lesions; miliary tubercles; areas of broncho-pneumonia; caverns of various sizes and shapes, sometimes communicating with one another, undermining the greater part of a lobe or lung. Traversing the walls of these cavities are frequently seen arteries which, owing to lack of support, have developed upon them aneurismal dilations, which subsequently rupture and give rise to hæmorrhage. These cavities may be either dry, representing a healed process, or they may contain muco-pus or pus, and have lining them a pyogenic membrane. The bronchial glands in pulmonary tuberculosis are frequently invaded; they may show infiltration, areas of caseation, or may become impregnated with lime-salts. The pleura is usually involved, and the entire sac may be obliterated; a caseating mass may rupture into the cavity instead of a bronchus, and give rise to an empyema or pyopneumothorax.

Symptoms.—**FIBROID PHTHISIS.**—Fibroid phthisis, as its name implies, is a condition in which there is a preponderance of the fibrous element; it frequently commences as a pulmonary cirrhosis upon which later the tubercular process is superimposed; in many instances it is tubercular from the beginning. Owing to fibrous contraction, there is marked diminution in the size of the affected lung; the thorax caves in to fill the space caused by shrinkage of the organ, which leaves a larger area of chest-wall exposed to the apex-beat—when the change affects the left lung. The disease may last for years and the patient enjoy, during that time, fairly good health; there is usually dyspnœa on exertion. With the formation of cavities the usual physical signs appear, and more or less profuse expectoration

occurs, which may, owing to its retention, become foul and undergo putrefactive changes—causing a horribly-offensive odor. Erosion of blood-vessels gives rise to frequent hæmorrhages, which may finally prove fatal. There is little absorption, owing to the effectiveness with which the process is shut off from the general system, and, consequently, no fever. Amyloid changes are common.

PHTHISIS FLORIDA, OR GALLOPING CONSUMPTION.—In acute, or galloping, consumption there is usually the clinical picture of an ordinary lobar pneumonia—with suddenness of onset and chill rapidly followed by fever, pain in the side, and cough with rusty sputum. There are the ordinary physical signs of increased tissue-density. The crisis fails to appear at the expected time, and with the breaking down of the broncho-pneumonic area, which occurs in the latter half of the second week, there is a profuse muco-purulent expectoration, which may excite suspicion of the real nature of the trouble. An examination of the sputum shows numerous bacilli, and the clinical picture now becomes one characteristic of pus-absorption. There are chills, fever, and drenching sweats; the temperature becomes irregular and shows the usual evening rise; the pulse is weak and frequent, the respirations rapid, and there may be marked dyspnoea. The hectic state soon supervenes, and the patient dies from gradual exhaustion.

Upon opening tubercular abscesses many years ago, before antiseptic precautions were observed, infection by pus-cocci took place, a mixed infection resulted, and the clinical picture dominating the case, that which gave it its similarity to consumption, came on only after communication with the air had been established, or, in other words,

after secondary infection had occurred. It is the pus-coccus which is largely responsible for the picture long recognized as consumption, and not the bacillus of tuberculosis. Eliminate the result produced by its action in chronic ulcerative phthisis, and that disease would never have been known by the familiar name which it now bears. Pulmonary tuberculosis of the chronic ulcerative type should be looked upon in almost every instance as a dual disease, one in which several factors, chiefly two, are simultaneously at work, and in which the bacillus of tuberculosis and the pus-coccus play the relative parts; the one, the bacillus, through its coagulation-necrosis acting as the gate-opener to the other, the pus-coccus, the peptonizing invader which liquefies the tissues and produces that poison which, when absorbed, gives rise to chills, fever, sweats, emaciation, and the consumptive appearance.

CHRONIC ULCERATIVE PHTHISIS.—The onset of this disease is varied; it may have commenced in an acute tuberculosis of the lungs which has merged into the chronic type. It is not uncommon to see a galloping consumption diagnosed as pneumonia or typhoid fever, and after several weeks the case pass on to one of chronic phthisis.

By far the commonest mode of onset is with a bronchitis; the patient may have been severely exposed, and speaks of having contracted a cold which finally settled on the chest and which he cannot get rid of; there is more or less cough, dry at first; but finally profuse expectoration occurs, with fever and emaciation.

The disease may first manifest itself by gradual loss of strength and appetite; vomiting may occur, and there may be marked anæmia. Frequently it is ushered

ered in by hæmorrhage, which may be either profuse or slight; usually the amount of blood lost is slight. The patient may experience a sensation of tickling over a given lung-area, but is seldom able to tell from which lung the hæmorrhage takes place. These hæmorrhages may occur at varying intervals of years, with little or no progress of the disease, or, as occasionally happens, the other symptoms rapidly appear and the patient succumbs to the disease in a short time.

Literature of '97-'98-'99.

The rupture of some ramification of a pulmonary artery passing through a cavity is usually the cause of the blood-spitting. In 879 cases observed blood was expectorated in 30 per cent., and over half a litre in 15 per cent. This is a most unfavorable symptom if the temperature afterward rises, but in the early stages blood-spitting is usually a very favorable alarm-signal. Gerhardt (Berl. klin. Woch., No. 21, '99).

It is quite common to see well-advanced laryngeal tuberculosis with only slight pulmonary involvement, but involvement to a greater or lesser extent almost always exists. The majority of cases of pleurisy with effusion coming on insidiously are of tubercular origin, and the suspicion is not to be abandoned if the microscopical examination of that effusion prove negative. Localized areas of dry pleurisy are frequently the first indication of a tubercular process. In the beginning the disease often simulates intermittent malaria, with chill, fever, and sweat; but its resistance to quinine should excite suspicion, particularly if there are other factors in the case, such as cough or gradual loss of weight. In children tuberculosis of the lungs not uncommonly results from the downward extension through the lymph-channels

communicating with diseased cervical glands.

Literature of '97-'98-'99.

Pulmonary tuberculosis in children frequently manifests itself without a cough. There may be moist râles at times, a little harsh breathing, and slight elevation of the temperature. Frequently there are small areas of dullness in the lung, caused by either consolidation or from enlarged and swollen bronchial glands. Then, again, there are cases of tuberculosis in which there may be no pulmonary symptoms or either percussion or auscultation, and where the clinical history is absolutely negative.

The symptoms to be relied upon chiefly in making a diagnosis are loss of weight, disturbances of digestion, a slight attack of febrile malaria, besides constant irritability. Such children will frequently show very slight, if any, pulmonary symptoms, so that the diagnosis must be made by a process of exclusion. Such distinct diagnostic features as the presence of cough, expectoration and tubercle bacilli, dullness on percussion, with moist râles and night-sweats, as found in the adult, are out of the question. It is not an easy matter to diagnose a case of tuberculosis, and it is a safe advice to follow, "to observe a suspected case of tuberculosis for several weeks, and sometimes months before giving a positive opinion relative to either the diagnosis or more particularly to the prognosis in a given case." Louis Fischer (Jour. of Amer. Med. Assoc., Oct. 29, '98).

With the appearance of the onset, after a greater or lesser period of time, the other symptoms of the disease usually manifest themselves. The slight, dry, hacking cough becomes more pronounced and productive of a thick, muco-purulent expectoration; it may either be increased or decreased by lying down or upon assuming certain positions, and in many instances causes great pain, particularly aggravating that of the usual then existing pleurisy. The sud-

den, convulsive movements to which the thoracic contents are subjected result in more or less trauma. As softening and breaking down take place, the expectoration becomes more profuse. Cough is Nature's effort at drainage; it is her attempt to rid the organism of an offending substance, no matter whether that be an irritating area of pleuritic inflammation in the first stage of the disease or broken down and softened lung-tissue—in other words, sputum—in the later stage. It is an accompanying provision for this breaking-down process and for the emptying of night accumulations occurring in cavities. Many patients after this morning cough, which rids them of the excess of sputum accumulated during the sleeping hours, this resulting from decreased reflexes, pass the remainder of the day in comparative comfort. The cough may be of such severity as to produce vomiting, and is apt to become worse at night after the patient has gone to bed; he may have several attacks before morning. These occur with some degree of regularity and produce loss of sleep, while sweating follows the violent exertion.

Pain in the chest, usually localized and corresponding to an area of pleurisy; sharp, knife-like, and sudden; increased upon exertion, cough, or breathing, may persist for days or weeks or it may be transient.

Rapid emaciation and loss of weight is found in nearly every instance at some stage of the disease; it is frequently the first thing to attract the patient's attention to himself, and, taken alone, is one of the surest guides of the progress of a case.

Sputum.—The sputum varies greatly in quality and quantity, and depends somewhat upon the rapidity with which

destruction is going on, and whether or not there be a mixed infection. It may be mucoid, muco-purulent, or purulent, then watery; or may contain the thick, yellowish, lump-like masses which sink and which may have created suspicion of the real nature of the trouble. Bacilli are found in varying numbers and are particularly numerous in the cheesy particles which show up plainly when a layer of sputum is spread upon a smoked glass. There may be calcareous masses or chalk deposits in which bacilli exist in great numbers—those representing cast-off foci. Elastic tissue is evidence of destruction; it may be seen with the naked eye, and under the microscope it is often possible to determine its source, whether from blood-vessel, bronchus, or alveolus. In cases showing mixed infection there may be seen the various forms of pus-organisms. Red blood-cells are not uncommonly found, particularly after blood-spitting, and the migrating white cell is rarely absent.

Literature of '97-'98-'99.

Stress is laid on the importance of an early diagnosis, on examination of the sputum and the respiration: other physical signs not recognized. The examination must be made daily, and sometimes it will be only after the twenty-fifth or thirtieth time that the exact seat of the complaint can be located. Osler (*Med. Rec.*, Sept. 9, '99).

The fever of tuberculosis varies with the stage of the disease and the rapidity of the process. In incipient cases the thermometer may register normal for the greater part of the day, and show only a slight rise toward evening. A constant evening rise of temperature of from one-half to one degree, particularly if the patient is debilitated or shows signs of dyspepsia, should excite suspicion. The maximum temperature oc-

curs about four o'clock in the afternoon, the minimum about four o'clock in the morning; but there are many irregularities, and the temperature-curve, as well as the disease, is erratic. Not uncommonly, in the advanced stage when marked asthenia exists, the thermometer fails to register by mouth, while, at the same time, the rectal temperature will be above normal; this is more likely to occur in the morning. The temperature-curve may simulate that of malaria; but, with the beginning of the breaking-down and softening process and with the absorption of fever-producing products, it becomes continuous, showing marked irregularity and the tendency to evening exacerbations. When mixed infection with the pus-cocci is present, there is the characteristic temperature of pus-absorption. In far-advanced phthisical patients, rest in bed, in many instances, converts a remittent temperature-curve into one that is intermittent; and, *vice versa*, following exercise, an intermittent curve may become continuous and assume the remittent type. The pulse, as the fever, varies with the degree and rapidity of the process; it is usually rapid and soft, and such a pulse may have been the first thing to cause suspicion of the disease. The veins become more prominent, owing to the wasting of their tissue-beds and the pale, anæmic background upon which they are seen.

Literature of '97-'98-'99.

The importance of chloranæmia as a sign of the pretuberculous state is emphasized particularly when this condition of the blood is associated with poor chest-development or decreased respiratory capacity. Abnormally low weight, chest-development, and respiratory capacity have no great value in themselves, but they are of distinct importance when compared with the height of the individual. In a normal man the product

obtained by dividing the weight expressed in pounds by the height expressed in feet should be 26, in a normal woman 23. The average measurement of the chest, one measurement being taken at full inspiration and the other at full expiration and the mean used as the average should equal at least half of the height; and the amount of air (in terms of cubic inches) that a man can exhale after a full inspiration should have a ratio to the height of the man (in inches) of 3 to 1, in case of a woman of 2 to 1. Reduction in any or all of these normal ratios should lead to a suspicion of predisposition to tuberculosis, as should persistent digestive disturbance that otherwise seems causeless. The pulse in the pretuberculous stage is characteristic, in that it is not influenced in its rapidity by change of position and is of feeble tension. Henry P. Loomis (Med. Rec., Dec. 10, '98).

Active exercise, meaning by this a fairly rapid walk of from two to four miles upon a level road, increases the bodily temperature to some extent, even in health. In convalescence, anæmia, chlorosis, and other constitutional states, temperature may reach as high as 100.5° F. A temperature above this is almost always indicative of tuberculosis. All suspected cases in which active exercise was followed by a temperature above this, were invariably found to be tubercular. Penzoldt (Med. Rev.: Amer. Med. Comp., July, '99).

Night-sweats are common, and are one of the features of the disease; they may follow violent coughing-spells or the subsidence of the fever. In the early hours of the morning the patient awakes to find himself covered with moisture; his night-garment may be saturated and the bedclothing moist. These sweats are chiefly the sweats of exhaustion.

After the initial hæmorrhage, in the beginning of the disease, there may be an absence of symptoms for months or years, or recurrent hæmorrhages, which are usually slight, may occur and may be a special feature in the case; a blood-

tinged expectoration which lasts for weeks, producing more or less anæmia and gradual exhaustion, is quite common. Oftentimes hæmorrhage comes on independent of exertion, while the patient is in bed or is quiet, and in many instances there is subsequently a marked general improvement, while in others the disease may rapidly progress and the patient pass on to an advanced stage. The bleeding which occurs early in phthisis is usually slight, and death from hæmorrhage is rare; later, after ulceration and cavity-formation have taken place, erosion of a large vessel not uncommonly occurs, and the respiratory tract may be inundated and the patient die of asphyxia. A cavity may fill with blood, and the weak condition of the patient prevents him from raising it, under which circumstances it remains concealed. The disease may terminate by syncope, coma, or asphyxia, but the latter is a rare condition, and death most often occurs from exhaustion.

Physical Diagnosis.—In any well-advanced case of ulcerative phthisis pathologically there may be seen at the same time all stages of the disease which, for convenience of clinical study, will be arranged in the following order:—

The first, or incipient, stage, or that of infiltration and beginning of consolidation. The second, or moderately-advanced stage, or that of advancing consolidation and the beginning of softening. The third, or far-advanced, stage, or that of softening, break-down, and cavity-formation.

INFILTRATION.—There is slight defective percussion resonance over the affected area, and, on palpation when standing behind the patient and placing the hands in the supraclavicular spaces, a slight increased vocal fremitus over the diseased apex is revealed. This in-

creased fremitus is usually first appreciated over the apex posteriorly. On auscultation there is a slight increase of vocal resonance.

Inspiration loses its breezy character and is partially suppressed, generally becoming broncho-vesicular in character, its duration shortened, and there is a slight interval between its termination and the beginning of expiration. The latter is *high in pitch* and is prolonged; jerky, cog-wheel, or wavy respiration is often heard.

Literature of '97-'98-'99.

Cog-wheel inspiration is a valuable early sign of pulmonary tuberculosis. While this peculiar form of inspiration may be caused by other conditions than that of beginning tuberculosis, its occurrence immediately below the clavicle, especially on the left side, should always arouse suspicion, especially where there is an hereditary tendency, history of exposure to infection, or any progressive failure of health and strength without other assignable cause. J. P. Arnold (*Med. News*, Mar. 20, '97).

The following method of examining the lung will reveal a very small lesion. The patient's hand is placed on the opposite shoulder, the ear is placed over that portion of the lung uncovered by the scapula, viz.: just above and external to where the bronchial tubes are given off; there will be heard prolonged tubular breathing and fine râles on coughing. This is the very first physical sign of tuberculosis—an evidence which will make a diagnosis possible weeks before the signs are evident in front and beneath the clavicle. The tuberculin test is useful both in making the diagnosis of a beginning case and in deciding if a case is cured. It is to be applied in the following manner: The patient's temperature is to be taken every six hours for a few days to see he has no diurnal temperature above normal; then $\frac{1}{2}$ milligramme of tuberculin is injected and his temperature is taken every four hours during the next twenty-four hours. At

the end of two days, if there has been no temperature above one degree, a second injection of 2 milligrammes should follow; if there is still no reaction after two days more, a third and final injection of 5 milligrammes is given. If there is still no reaction, the patient is free from tuberculosis. H. P. Loomis (Med. Rec., vol. liii. No. 21, '98).

SECOND STAGE, OR CONSOLIDATION.—As the process advances from infiltration to consolidation the physical sounds become more pronounced, fremitus and vocal resonance are much increased, and on inspection there is seen a failure of expansion over the affected area, with slight sinking in of chest-wall. The percussion-note is dull, higher in pitch, shorter in duration, wooden in character, and the percussion resistance is much increased: deceptive cracked-pot resonance may be obtained over the main bronchi, and on auscultation, as the vesicular element becomes eliminated, the broncho-vesicular passes into bronchial breathing and bronchophony results.

The expiratory note is now very markedly prolonged and blowing or tubular in character. Not infrequently the heart-sounds are heard over these consolidated areas with as great or greater intensity as at the normal site of the apex-beat.

At the point where the process is most advanced scattered or isolated crepitant râles are now heard at the end of inspiration, and gradually become more closely massed and progressively pass into subcrepitant and mucous râles, which indicate the beginning of softening, followed by breaking down of the tissue as the disease passes into the third stage.

THIRD STAGE, OR THAT OF CAVITY-FORMATION.—On inspection there is now seen superficial and rapid breathing and uneven expansion of the two sides of the chest: sinking in of the supra-

clavicular and infraclavicular spaces causes undue prominence of the corresponding clavicle. The auxiliary respiratory muscles of the neck stand out prominently, owing to the general emaciation and to the increased work thrown upon them. The angle of the scapula of the affected side, upon deep inspiration, lags behind its fellow, and fails to make the normal excursion. The intercostal spaces are wider than usual, and the chest is frequently long and thin and the scapula winged.

Increased vocal fremitus is found over consolidated areas and over cavities, is much intensified, and is of considerable diagnostic value.

Often the heart's impulse is distinctly visible at some distance from the patient; the more the lung is contracted, the wider the area over which this impulse can be seen.

It is not infrequent to hear, in patients having cavities, when they are asked to open the mouth and to breathe as gently as possible, a short puffing sound similar to that produced by blowing over the open mouth of a small bottle; it occurs with each heart-beat and is evidently produced by that organ acting as a plexor and the intervening tissue between it and the cavity-wall as the pleximeter. It might naturally be supposed that the nearer the heart to the cavity, the greater distinctness with which the sound would be heard; but in cavities at either apex the sound is heard with peculiar loudness.

The dullness found on percussion in the second stage continues throughout the later stage of the disease and over cavities with their walls in open communication with a bronchus; cracked-pot resonance is obtained when the patient is directed to open the mouth and a quick sharp percussion-stroke is made.

On auscultation sharply-defined subcrepitant râles give way to moist, bubbling râles of all sizes, and when cavitation has occurred there will often be heard the metallic tinkle or mucous click.

Over the site of the cavity will be heard a blowing, cavernous, or amphoric breathing, while around about it will be heard tubular and bronchial breathing varying in intensity according to the density of the consolidation, and in some instances the bronchial breathing will vary in degree in different areas near or remote from the cavity.

Whisper-resonance is generally present and is marked in character.

THE ROENTGEN RAYS AS A DIAGNOSTIC AGENT.—The Roentgen rays have become, during the past three years, an accepted diagnostic agent in pulmonary diseases. During 1896 and 1897, Bouchard, of Paris; Stubbett, of Liberty; and Williams, of Boston, published, in the order named, papers showing positively that, by means of shadows and lights thrown on the fluoroscopic screen, many diseased conditions could be accurately diagnosed.

Generally speaking, the Roentgen rays are valuable in corroborating signs discovered by auscultation and percussion, but, at times, by their aid, we can discover incipient lesions or small isolated foci of infection not recognizable by ordinary methods of examination.

In addition, the fluoroscope enables us to recognize more fully and accurately the degree, position, and relation of areas of infiltration and consolidation, and also delineates plainly the limits of these areas.

Method of Examination.—Two things are requisite for the successful use of the fluoroscope: a certain amount of practice and a primary knowledge of the

fluoroscopic picture of a normal thorax. The thinner the subject, the more immediate and easy the diagnosis. In all subjects one has, as does the tyro with the ophthalmoscope, to look for nothing until he can see something. The patient is placed standing before or lying above the Crookes tube for examination by the fluoroscope. A better method, however, is to seat the patient on a chair without a back, with the Crookes tube held between the scapulæ and the fluoroscopic screen in front of the chest. A dark cloth now being placed over the tube and the patient's shoulders, concentrates all the light upon his chest, and the whole outline of the thorax appears as a picture upon the screen in front of the patient.

The advantage of this method is that both sides of the chest are exposed simultaneously; the comparisons are, therefore, more accurate.

When the fluoroscope is used it should be applied firmly and evenly to the bared chest, and, the two clavicles having been located, their relative distinctness of outline will generally indicate the side which is involved.

Having examined the apices, the fluoroscope is passed up and down the whole thoracic region in search of other foci of infection.

Normal Chest.—In about 50 per cent. of normal chests the right apex is not quite as clear as that on the left side. The normal lung is more transparent, and the reflex brighter at the end of inspiration. The ribs are more clearly defined during inspiration, and in a healthy chest an evenly clear transmission of light is visible between them.

Infiltration.—In cases of slight infiltration there is a haziness or fog between the light and the observer. The clavicle may, in other instances, appear to

have a gauzy veil thrown over it. This haziness, as the infiltration advances, becomes a light shadow, the ribs becoming more indistinct, and the borders of the haze or shadow fade away gradually to a normal reflex. On deep inspiration this light shadow becomes slightly more gray in color.

Occasionally a slightly-thickened pleura at the apex may lead one to diagnose infiltration, or, rather, the beginning of consolidation, as the pleural shadow is darker than a haze. When, however, we remember that a sharply defined pleurisy at the apex generally signifies underlying tubercular infiltration, there is but a slight chance of error in diagnosis.

Consolidation.—When there is marked consolidation, the transmitted light is relatively less, the edges of the clavicle are indistinct, or the bone may be invisible. The limits of the consolidated area are sharply defined, and ordinarily are bordered by an area of haziness. When pathological changes are present at both apices it is an easy matter, by comparing the two sides, to decide upon which the disease has made more progress. Comparative shadows at the apices are generally more clearly defined from behind than in front.

By use of the fluoroscope a practiced eye can clearly distinguish areas of the most incipient infiltration, sometimes before appreciable by auscultation or percussion and very often before their presence has been suspected. Williams, of Boston, says that, when examining a lung known to be diseased, he has found an unsuspected focus of infection at the opposite apex. The writer has found foci of disease in the lower portion of the lungs in a number of cases under treatment for apical disease. In some instances these spots cleared up: in

others auscultatory signs subsequently developed.

In cases of complete dullness, say to the second interspace, with relatively less dullness for one or two interspaces below, a dark shadow will be seen over the first-named region, that of consolidation, which will gradually shade off consecutively into haziness and normal reflex of light below, the area of haziness corresponding to the limits of relative dullness or infiltration.

Softening or Excavation.—As consolidation gives way to softening, flashes or spots of light come through the darkness; then we note a fairly well defined area of light with dark spots scattered through or dark lines or reticulæ across its face; this represents disintegrating tissue. And finally the dark spots or lines of *débris* disappear, and then appears the bright reflex of a formed cavity. Cavities appear as more or less well defined areas of brightness amid shadowy tissues. When perfectly round they appear like a full moon behind a cloud. Such small regular-shaped cavities may be situated in a large area of dense shadow or merely surrounded by a ring of darkness, the limits of these shadows corresponding to the area of percussion-dullness. It is more difficult to map out or even diagnose positively, large, irregularly-shaped cavities, and very often one must have recourse to the steel rod as an aid, the shading off being too uncertain for the eye alone to determine the limits of the excavation. In cases of multiple cavities the dense intervening fibroid tissue will be shown in the form of dark streaks winding between the spots of bright reflex. These streaks, or bands, differ in appearance from those seen in areas of softening, in that they throw a darker shadow, and the light does not penetrate them in

spots as it does the tissue undergoing disintegration.

Miliary Tuberculosis.—This form of phthisis shows itself in scattered dark spots, giving the lung a mottled appearance; there is nothing regular about the arrangement or size of the spots; when cavitation has occurred it is, as a rule, relatively difficult to define the outlines of the cavities.

Prognosis.—It is important to be able to give a fairly-accurate prognosis both as to the ultimate result of disease in a given area, as well as the length of time that will be required for its termination either favorably or unfavorably. Uncertainty of prognosis entails positive suffering upon patients and their families. Pulmonary tuberculosis in the majority of instances is not necessarily a fatal disease, and the percentage of cures is increasing ever year. The number of cures at the Loomis Sanitarium at Liberty, N. Y., during 1899, is a fair illustration of the fact that a large majority of cases in the first and second stages can either fully recover or sufficiently arrest the disease, or improve their condition so as to resume their usual family and business responsibilities.

CONDITION OF PATIENTS WHEN ADMITTED.

Incipient stage without bacilli.....	12
Incipient stage with bacilli.....	23
Moderately advanced	50
Far advanced	14
	99

CONDITION OF PATIENTS WHEN DISCHARGED.

Incipient stage without bacilli.....	25
Incipient stage with bacilli.....	10
Moderately advanced without bacilli.	5
Moderately advanced with bacilli...	45
Far advanced	14
	99

The disease is more often contracted by females than males, but the prognosis is more favorable among the former, there being a difference in the percentage of cures of about 60 per cent. females to 40 per cent. males. This is due probably to the fact that her social condition allows her to place herself more promptly within proper environment for recovery of health.

The prognosis is most favorable between the ages of eighteen and thirty.

Environment has a decided controlling influence over the results of treatment. Proper climate, hygiene, and social diversions, as well as mental quietude, all tend toward a favorable result. Probably one explanation of the unfavorable results following various methods of treatment in homes and hospitals in cities is the lack of proper environment.

Heredity influences prognosis unfavorably if it has given to the patient a lack of vital capacity or corpulence, a malformed chest, or numerous foci of tuberculosis manifested during childhood.

The character and location of the pathological process has a strong bearing upon the results of treatment. The more tendency there is toward fibrosis and limitation of the disease to a given area, the more favorable the prognosis. Lesions of all characters at the apex heal more rapidly than those located at the base or middle portion of the lung. For instance, even a cavity at one apex will heal more certainly than a consolidation at the base. Small foci scattered through one or both lungs, accompanied, as they generally are, by systemic disturbances out of proportion to the physical signs, render the prognosis generally fatal.

The earlier the disease is discovered and the patient placed under treatment,

the more favorable the prognosis. Thus, in the pretubercular and the beginning of the incipient stage nearly every case should be cured unless there be some underlying hereditary influences which render almost *nil* the power of recuperation or resistance. The following results at the Loomis Sanitarium substantiate this statement.

There have been 456 cases admitted to the sanitarium since it was opened; of these there were:—

Incipient cases	163
Moderately advanced	216
Far advanced	77
	456

Of these, 407 were discharged and 49 are still in the sanitarium. Those discharged were in the following condition:—

INCIPIENT CASES.

Cured	61
Disease arrested	25
Improved	59
Unimproved	1
Died	1
	147

MODERATELY ADVANCED CASES.

Cured	7
Disease arrested	10
Improved	121
Stationary	11
Unimproved	33
Died	3
	185

FAR-ADVANCED CASES.

Improved	3
Stationary	3
Unimproved	60
Died	9
	75

Therefore it is seen that of the in-

ipient cases 58 per cent. were cured or the disease arrested, of the moderately-advanced cases 9 per cent. were cured or the disease arrested, while in the far-advanced stage only 4 per cent. were at all benefited.

Bacteriological examinations throw some light upon prognosis, and promise to become more valuable in the future. Much can be learned from the size, shape, number, and arrangement of the tubercle bacilli; the presence or absence and the relative number of the various cocci and leucocytes, and the presence of blood or elastic tissue.

When there is a gradual diminution in number of bacilli extending over long periods of time, passing from numerous to moderate, to few and finally to none, improvement may be inferred. But to base an opinion upon one microscopical examination of sputum, either for prognostic or diagnostic purposes, is not uncommonly homicidal to the patient. How often do we meet with instances in which a final and an erroneous verdict has been rendered after only one examination of sputum, which specimen happened to be negative, and the patient, in ignorance, has continued his pursuits and method of living, which may have been the deciding factors in his case!

As for the arrangement of the bacilli, there appears to be some reason for associating a sputum in which the bacilli are congregated into clumps, with few scattered throughout the field elsewhere, with an effort on the part of Nature and her ability to cast off individual foci; and it seems as if the protecting cells were able to prevent a general inroad upon the tissues, and had confined the invaders to individual bands and to local points of attack. This appearance is certainly common in incipient cases which are becoming rapidly improved.

The specimen of sputum which is thin, with numerous bacilli evenly distributed throughout the field, with a noticeable reduction of the corpuscular elements, the few that remain granular failing to take well the stain, is a vicious sputum, and the thinness of it and the absence of the cells probably mean that the protecting phagocytes show such little resistance that the vast majority are broken up in the struggle, and the few remaining show a tendency to become disintegrated, thus demonstrating the poor resistance of the invaded tissue. Such a sputum is indicative of a low tissue-vitality, and it is the general character of this sputum upon which most reliance is placed.

Complications affect the prognosis very appreciably. Diabetes, Bright's disease, or very decided functional disorders of the heart or an affection of the meninges, as well as destructive tubercular involvement of the epiglottis or larynx, are among those that render the prognosis absolutely fatal. On the other hand, slight tubercular disease of the intestines, bladder, and kidneys is amenable to treatment. Tubercular involvement of the larynx, even if ulceration be present, if no extensive destruction of tissue has occurred, yield a fair percentage of cures.

Asthma seems to have a decided retarding effect upon the progress of pulmonary tuberculosis, delaying the fatal result sometimes for years. It also seems to prevent an absolute arrest or cure.

Literature of '97-'98-'99.

Thrombosis occurred 19 times in 1778 cases of pulmonary tuberculosis. Of these 6 patients were between 20 and 30, 7 between 31 and 40, 5 between 41 and 50, 1 was 60 years old. Of the patients 12 were women, 7 men. They were practically all advanced cases of phthisis in which death ensued within one or several

months. The thrombosis affected a great variety of veins, most frequently those of the lower extremities. H. Ruhl and Hierokles (Berl. klin. Woch., Jan. 23, '99).

The prognosis in all stages of the disease is relative to the degree of carefulness exercised by the patient. Carelessness can render a case hopeless that possesses all the other factors that make up a good prognosis.

Treatment.—**SELECTION OF CASES.**—Individualization of patients is the keynote of successful treatment of tuberculosis; in nothing is this so manifest as in the selection of the climate or resort to which individuals should be sent.

Solly, for the sake of convenience, divides his cases into three forms: tuberculous, pneumonic, and catarrhal.

Purely tubercular cases, catarrhal cases, or those combining these two characteristics, do better in cold, dry climates, while for pneumonic cases a warm, dry climate is preferable. As the majority of cases met with present the dual character of tubercular and catarrhal, it may be stated that, in general, curable or arrestable cases do better in a cold, bracing climate at a moderate elevation of two to three thousand feet above sea-level. Again, we often meet patients in whom certain organic heart-lesions contra-indicate residence at a high altitude or one whose disease is complicated by diabetes, indicating the necessity of moderately-high elevation.

The more incipient the tuberculosis, the more pure is its tubercular character, and such cases are better adapted to a high altitude.

Change of environment is advantageous in itself, but of more importance is the selection of a resort at an altitude which seems to be indicated in individual cases. Very little can be said

in favor of an altitude less than fifteen hundred feet; the experience of some seems to indicate that many patients do well at heights of five to ten thousand feet. The majority of the tuberculous, however, as they appear before the physician for advice, seem to do best at elevations of two to three thousand feet.

A few years ago the majority of patients sought warm climates in the winter and returned home during the summer; the result in the majority of instances was eventually fatal. To-day it is a recognized fact, that if a given patient is possessed of ordinary resisting power, it is better for him to winter in a cold, dry climate rather than a mild one: for example, the Loomis Sanitarium at Liberty, New York, is situated on the top of a mountain-range exposed to rigorous, northwest winds at an elevation of twenty-three hundred feet above sea-level, and the winter temperature ranges between ten above and ten below zero, F., yet the percentages of good results attained are higher in the winter than in the summer months. It is undoubtedly a mistake to send to cold climates patients who have passed into the third, or far-advanced, stage of the disease,—in other words, hopeless cases,—first, because they do not possess sufficient vitality to be comfortable, and, secondly, because it is the inalienable right of a doomed man to spend his dying hours among his friends and kindred.

Having selected the locality in which it is hoped to effect a cure of the patient's disease, it is imperative to impress upon him the necessity of remaining *continuously* there until the desired end is accomplished. It is difficult for patients to realize the danger they incur by short visits to their homes or lower altitudes.

To obtain the full benefit of climatic influences, patients should remain out-of-doors from seven to ten hours a day during the entire year. It is astonishing how soon they become accustomed to such an out-door life; after having exercised sufficiently, they rest in chairs on verandas with the temperature ten below zero and the snow often blowing around them; such a length of time out-of-doors is not easily attainable among private patients located in boarding-houses or hotels, their environment and associations tending more directly toward an in-door life, and it must be acknowledged that the percentages of good results are proportionately lower than among sanitarium patients.

Patients should pass their sleeping hours in a room with the windows widely open; it is of no moment if the cold air blows directly upon the bare head, providing the body and limbs are warmly covered.

At lower altitudes, those below fifteen hundred feet, the proper way to ventilate in damp weather is to have the windows open in the room adjoining that of the patient and have an open fireplace in the room the patient occupies; in clear weather, the room should be ventilated as described above.

There is among the tuberculous a fear of cold sponging; two or three hot baths should be taken each week and a tepid plunge-bath every morning, followed by a cold sponge and brisk rubbing.

The dirty and unsanitary spit-cloths so much in vogue and, unfortunately, advised by physicians, should never be employed; they are potent sources of contagion, soiling the clothing and hands; whenever it is possible, sanitary sputum boxes with close covers and combustible linings should be used and the linings burned daily. For use on the

street and other public places nothing is better than the Dettweiler sputum-flask.

Diet.—Diet, in the treatment of tuberculosis, is a much abused and poorly understood term. It is a difficult thing to persuade many an incipient case that he must not, of necessity, stuff his stomach with concentrated nourishment from four to six times daily. In advanced cases at all times, and in a very few incipient cases when they first come under observation, specially-arranged diets are necessary. In 90 per cent. of incipient cases nothing is better than three substantial meals a day.

• The appetite of convalescing tubercular patients is something extraordinary. Climate, out-of-door life, and tonic treatment all tend to increase the powers of digestion; nevertheless, in most cases, periodically there will arise disorders from overfeeding, which will require treatment. Nothing is more simple to overcome than these so-called bilious attacks, and, after a rest of a few hours, the patient will recover his appetite and power of digestion.

However, we know that a large number of cases of tuberculosis is due, primarily, to lack of assimilation, and it is not strange that we find quite a percentage of patients with chronic gastritis and dilated stomachs. Most cases of this nature can be relieved by siphon irrigation of the stomach three times a week, and, if dilatation be present, Einhorn's electrode may be introduced and faradization practiced.

Milk or cream, meat, eggs, vegetables, and game are all staples that should be liberally provided. When patients first come under treatment, owing to a generally depreciated vitality, it may be advisable to allow a cup of broth or bouillon or a glass of milk between meals; but as early as possible this extra diet

should be dispensed with. Occasionally, even in incipient cases, the digestive functions are so impaired as to make it imperative to select a special diet, until, by the use of electricity and lavage, they have been restored; the following is a good selection for most cases:—

7 A.M. Two soft-boiled eggs. Two slices of buttered toast. One cup of coffee with milk, cream, and sugar.

9.30 A.M. Koumiss (10 ounces) and two slices of bread and butter.

12.00 M. Lamb-chops, steak, or chicken. Mashed or baked potatoes. Boiled rice in milk. Toasted bread and butter. Weak tea with milk and sugar.

3.00 P.M. Same as 9.30 A.M.

5.30 P.M. Meat-soup with farina or the like in it. Squab or other meat. Spinach, asparagus, green peas, thickened rice, or some pudding (custard).

8.30 P.M. Koumiss, crackers and butter, or oysters, ale and crackers, or a sandwich and stout.

Individual Medicinal Treatment.—There is too great a tendency among the profession to depend mainly upon one line of treatment in this disease. Either the patient remains at home and becomes the recipient of medicinal treatment or is sent away with the instruction to depend upon climatic influences for the arrestment of his trouble. Clinicians of experience among the tuberculous in various health resorts all recognize that good results can generally be looked for *only* when climatic influences are supplemented by judicious symptomatic treatment.

Only a few years ago the recognized treatment of phthisis was to administer sedative cough-mixtures and deliver the hopeless patient over to the kind and cheerful ministrations of priest and neighbor. Then came the era of dosing, and codliver-oil and creasote followed.

Now climate, hygiene, and dietetics very properly form the basis of all intelligent treatment of tuberculosis. The remarkably encouraging results attained at sanitariums in America and abroad have aroused the profession from a lethargy born of hopelessness.

The public is at last beginning to understand, not only that tuberculosis is infectious, but that it is, in a large majority of cases, susceptible of cure. Recognizing this fact, the various health resorts of the country have been, for the past year, more than ever crowded with victims of this dread disease. Unfortunately, very many are imbued with the idea that climatic influence alone is all that is needed to restore them to health.

No general line of treatment can be laid down for even a small percentage of tuberculous patients. We must not expect to treat successfully pulmonary tuberculosis in the abstract, but every case must, in justice, be treated in accordance with its individual manifestations of disease, idiosyncrasies, and complications.

Probably it is this individualizing of patients that is largely responsible for the comparatively flattering results obtained among sanitarium patients over those attainable in private practice in the same climate.

In very incipient cases, in those of the pretubercular stage, climate and out-of-door life are generally all that is necessary to insure recovery, but, unfortunately, the percentage of such cases is small when the disease is recognized. The general run of so-called incipient cases all present complications of one sort or another demanding treatment in order to remove conditions which, if allowed to remain, will, to say the least, severely handicap the patient in his fight for life and restoration to health.

Symptomatic treatment and individualizing of patients are exceedingly important in all cases. Almost invariably anæmia is present and must be removed. This is most readily accomplished by administering iron and static electricity. Among various forms of iron the following are preferable: pecto-mangan, tr. citro-ferri chloride, and Bland's pills. Static electricity should be given for one hour daily, the patient being charged through the negative pole except in decided neurotics, in whom the current should be reversed. Functional cardiac disorders should be controlled by strychnine, digitalis, strophanthus, or glonoin. Strychnine in mild cases should be given in doses of $\frac{1}{100}$ grain three times a day; in more advanced cases larger doses should be used. Bitter tonics are indicated from time to time; a happy combination in the majority of cases may be:—

R Tr. nux vomica, gtt. v-x.
Tr. gentian co., 1 drachm.
Fl. ext. condurango, gtt. v-x.

M. Sig.: Three times a day.

Syrup of hydriodic acid combined with syrup of hypophosphites is also an excellent tonic.

Coughing is best controlled by codeine sulphate, $\frac{1}{4}$ to $\frac{1}{2}$ grain; or heroin, $\frac{1}{12}$ to $\frac{1}{6}$ grain, given according to circumstances every three or four hours or at bed-time. All forms of cough-mixtures and syrups are mischievous.

Night-sweats are controlled by atropine in most patients; hypodermic injections of nitrate of silver are reported to be of value in obstinate cases; camphor is at times advantageous.

Literature of '97-'98-'99.

In night-sweats camphoric acid acts more powerfully than either atropine or agaricin. The tendency to excessive

sweating seems to disappear. Thirty grains should be given at night two or three hours before the sweating begins, or in two doses at short intervals, in powder, capsules, or cachets. Ralph Stockman (Edinburgh Med. Jour., Jan., '97).

The night-sweats of phthisis may be controlled by giving an hypodermic injection of $\frac{1}{80}$ grain of atropine sulphate at bed-time. After three or four nights it may be suspended, and it may not be necessary to revert to it for a week or more. Pierotoxine, in doses of $\frac{1}{80}$ grain at bed-time, is also of value. William Murrell (Med. Brief, Jan., '98).

HÆMORRHAGES, OR HÆMOPTYSIS. — Ice to the chest; absolute rest in bed; a brisk cathartic, followed by periodical hypodermics of morphine sulphate and atropine combined, or atropine alone, is the treatment *par excellence* in all cases in ordinary practice; ergot is of doubtful value, and the same may be said of eating cracked ice, which simply keeps throwing more liquid into the circulation; in severe hæmorrhages, if the above remedies fail to produce the required result, it may become necessary to apply ligatures or bandages to one or all extremities. In hospital and sanitarium practice, also in large cities, we have available a much more certain and safe remedy in the compression of the lung by gas injected directly into the pleural cavity; in profuse hæmorrhages, where the pressure need be only temporary, oxygen-gas as found in the markets will be all that is required, as ere it is absorbed a clot will probably form.

In those cases in which slight and oft-repeated hæmoptysis is present, a more lasting pressure is required, and injections of nitrogen-gas are indicated, as this substance remains unabsorbed in the pleural cavity until removed; the effect of these injections is immediate and completely satisfactory. Rest in bed there-

after is not necessary after hæmoptysis, and only for a short time in hæmorrhages of more or less severity. (See also PULMONARY HÆMORRHAGE, volume v.)

SEMISPECIFICS AND ANTISEPTICS. — The profession is still searching for a specific for this disease. Iodine, menthol, cinnamic acid, oil of cloves, cod-liver-oil, peanut-oil, nitrate of silver hypodermically and externally, iodide of potassium, eucrophen, formalin, creasote, guaiacol, ichthyol, kalagua, tuberculin, antitubercle serum, various forms of cold and hot inhalations, and, finally, climate have all been strongly advocated by different observers as exerting a marked inhibitory influence on the progress of the disease.

Probably too much has been expected, or perhaps those attempting to apply the principles advocated by the originators of the several so-called semispecifics, have not sufficiently individualized their patients; hence the disappointment in many instances.

Creasote and its various derivatives are extensively used by the profession; it is best administered in doses not exceeding 15 drops of Merck's preparation or 5 to 20 drops of creosotal or five to 15 grains of guaiacol three times a day after meals. The liquid form of creasote and its derivatives may be administered in milk, but preferably in capsules of subnitrate of bismuth, 5 drops in each capsule. Creasote may also be administered in capsules containing codliver-oil.

Literature of '97-'98-'99.

In Dettweiler's sanitarium, at Falkenstein, creasote has been given a thorough trial, and has now been completely abandoned, along with tuberculin and all other specific remedies. General dietetic and hygienic influences are the only remedies relied on. St. Clair Thomson (Lancet, Oct. 30, '97).

Creasote should not be given to a patient with fever or signs of congestion (inflammation), nor with wasting, loss of appetite, nor long-continued hectic. It may be given when there is no fever, or only the slight fever of suppuration, as during the formation of cavities. It should not be given also when there is repeated hæmoptysis. E. Lemoine (*Le Nord Méd.*, Sept. 15, '97).

Cinnamic acid and oil of cloves are also used; the latter is administered in doses of from 5 to 40 drops, the amount being increased daily until the limit is reached or until the patient becomes so thoroughly saturated with the drug that the odor is apparent when he enters the physician's office. Cinnamic acid is a favorite drug of some physicians, but it is not so well tolerated by the stomach as the oil of cloves.

Ichthyol is, perhaps, the most valuable drug we possess in treating all cases of pulmonary tuberculosis presenting mixed infection. The best results are obtained from the administration of large doses, and if the drug is given in such form as to pass the stomach undissolved, amounts of 30 grains, three times a day, are easily borne and untoward effects are few. An occasional diarrhœa or an attack of vomiting which is preceded by the taste of ichthyol may occur. These symptoms quickly subside upon the withdrawal of the drug, and with its resumption the dose which caused the above symptoms can usually be given without further trouble.

The improvement is rapid, and within one month, in individual cases, where other beneficial factors are eliminated, there may be a gain in weight of eight or ten pounds, and in those patients whose weight had, previously, and under different surroundings, remained stationary for long periods of time. There is improvement in general nutrition, as

evidenced in females by return of menstruation. The fever, sweats, and cough diminish, the sputum is more easily brought up, is smaller in quantity, and is changed in character. In some instances expectoration is too quickly reduced, and patients experience difficulty in raising the sputa. In cases far advanced, those having a cavity, with excessive expectoration when ichthyol acts well, the effect is striking, and it is more suggestive of the important part played by secondary infection in tubercular processes.

Ichthyol changes the character from the fœtid, decomposed, purulent sputum into that which is mucoid and frothy, ameliorates the symptoms of fever, chills, sweats, and general failure of nutrition dependent upon the absorption of pus-products, so that it may be said that in such cases ichthyol practically accomplishes drainage, and, what is more important, tends to convert the function of the pyogenic membrane into one which secretes mucus instead of pus. The debilitating effect of pus-absorption is put aside, and there is general improvement noted.

Literature of '97-'98-'99.

Ichthyol has been personally employed in thirty cases of tuberculosis. In incipient stages the cough disappears in a few days. If the lesions are more extensive it may continue for some weeks or even months. Expectations become more liquid and less abundant. All the symptoms are much improved. Twenty to 40 drops of a mixture of equal parts of ichthyol and water should be taken four times daily. A little peppermint may be added. Fraenkel (*La Méd. Mod.*: *Med. News*, Oct. 30, '97).

Ichthalbin has some properties which make it slightly more acceptable to some few patients than ichthyol.

The large daily doses of ichthyol re-

quired renders it impossible, on account of the expense, to administer it to some patients, and a good substitute in such instances is kalagua. Kalagua, like ichthyol, changes the character of tuberculous sputa from purulent to mucoid within a short time. It has no deleterious effect on the functions of the stomach. Only small doses, from 4 to 8 grains, three times a day, are required. After more or less continued use of this drug it becomes necessary to occasionally remit its administration on account of temporary exacerbation of the congestion in the diseased area, accompanied by pain and ruder respiration.

Codliver-oil and mixed fats are very valuable when they can be assimilated. Milk, referred to under the heading of diet, may also be properly included among the food medicines. Patients should be forced to consume from two to three quarts daily. There need be but few exceptions to this rule.

Literature of '97-'98-'99.

For the medical treatment of tuberculosis codliver-oil in doses of 1 or 2 teaspoonfuls twice a day, given in extract of malt, is recommended. Arsenic is superior to iron. The latter increases the tendency to hæmoptysis, and is contra-indicated in the presence of pyrexia. Zinc oxide, in doses of 5 grains, is of value in night-sweats, and for the cough lozenges of licorice and gum acacia. Dry inhalations are also useful in checking cough; a saturated alcoholic solution of menthol or a mixture of equal parts of creasote, guaiacol, and spirit of chloroform may be used. Belladonna and codeine may be given for the relief of excessive secretion. Hector Mackenzie (Practitioner, June, '98).

Antitubercle Serum. — For the past eight years investigations have been carried on looking toward immunizing patients against tuberculosis, as well as

curing them when once infected. Most of our experience in this line of treatment has been with antitubercle serum of the United States Government, from its Biochemic Laboratory at Washington. De Schweinitz claims to *have produced immunity in a few pigs and markedly prolonged the lives of others.*

The use of antitubercle serum would seem to be indicated only in incipient cases and in those presenting a pure culture or simple infection. This, of course, refers to those cases which we hope to succeed in curing. In the writers' experience it has seemed, in a few advanced cases, to retard temporarily the progress of the disease; it decreased temperature and increased materially the strength of the patients.

Generally speaking, the use of antitubercle serum would seem to be contra-indicated in the third stage of tuberculosis, marked cases of softening or excavation, those of marked hereditary taint, in cases presenting a very rapid heart-action with relative feebleness of arterial pressure, and in those in whom corpulence, vital capacity, and conformation of the chest are much below the normal standard; also in cases presenting marked mixed infection.

There is but little, if any, danger attendant upon the administration of serum if the proper precautions in the way of antisepsis are observed. Urticaria, erythema, and other forms of eruptions; painful swellings at the point of injection; stiffness, pain, and sometimes swelling in the different joints, especially in patients presenting rheumatic histories; enlargement of the axillary gland, and myalgia are met with in a small percentage of cases. These symptoms, however, are not dangerous, but annoying, and, even in the small number of cases who present them, are

seldom repeated during subsequent treatment.

The advantages of serum treatment are: first, it does not tax the functions of digestion or produce gastritis, diarrhoea, or loss of appetite. Secondly, in cases wherein bacilli have disappeared *they have been lost while the sputa were still present*. There may be a certain immunity established in patients treated with serum, but it has not yet been proved.

Literature of '97-'98-'99.

For the preparation of T-R it is necessary to use young, highly-virulent cultures. The immunizing substances are conserved by the addition of 20-per-cent. glycerin.

Administration and dosage are simple. The injections, as in tuberculin, are given beneath the skin of the back. The fluid contains 10 milligrammes of solids per cubic centimetre, and before using is diluted with saline solution; the inaugural dose is $\frac{1}{500}$ milligramme. The injections are repeated every second day, and the dosage is gradually increased. Personally it has generally been pushed to 20 milligrammes. In the case of human tuberculosis the remedy is of little use in advanced stages or in those in which secondary infection has occurred. Robert Koch (*La Semaine Méd.*, Apr. 7, '97).

Twenty-three cases were treated in Mosler's clinic with the new tuberculin, 235 injections being given in all. Only early cases of phthisis were selected, and the tubercle bacillus was also found in the sputum.

There were no lasting unpleasant symptoms, but there was no cure. Stempel (*Münch. med. Woch.*, Nov. 30, '97).

By a judicious selection of the cases and a careful use of tuberculin-R no harm will be done, but apparently no striking or specific effects are to be looked for. Huber (*Berl. klin. Woch.*, Feb. 14, '98).

Antistreptococcic Serum.—This serum

is indicated in low altitudes where streptococci are present at all abundantly in the sputa. After one or two injections of 10 cubic centimetres each, the germs disappear temporarily. At altitudes of two thousand feet or more these germs disappear under climatic influences alone. The United States Government is now experimenting with a view to producing a serum that shall be antagonistic to both the tubercle bacillus and the streptococcus.

Inhalations.—Hot-air inhalations are used extensively and more or less successfully when troublesome cough or profuse expectoration are present. Combined with oxygen, these inhalations give great relief in many cases of pleurodynia and asthmatic dyspnoea. Hæmoptysis and scanty expectoration would seem to be contra-indications for their use.

The temperature of the inhaler should range between 300° and 400° F., and the drugs most advantageously employed are ichthyol, creasote, camphor, eucalyptus, turpentine, tar, origanum, and menthol.

Moist, hot inhalations are useless, if not absolutely harmful.

Cold, moist inhalations as generated by a multinebulizer are of undoubted value in cases of mixed infection and cavation; the drugs mostly used in the nebulizer are creasote, oil of pine, menthol, eucalyptus, tr. benzoin, camphor, albolene, tar, carbolic acid, extract of balm of gilead, etc.

Both forms of inhalations mentioned are also useful as inducing deep breathing.

Literature of '97-'98-'99.

Probably the best method of treating tuberculous phthisis is to obtain bacilli from the expectoration, cultivate them, pass over them various volatile substances until one is found which will

arrest their growth, and then administer it by inhalation. William Murrell (Brit. Med. Jour., Jan. 28, '99).

Hydrotherapy.—In the past few years hydrotherapy has assumed an important place in the treatment of pulmonary tuberculosis. The expense attached to the installation of a proper plant and to its administration are too great to admit of its use in private practice. It promises, however, to become, year by year, of greater value as one of the recognized treatments of this disease in sanitariums.

The outfit consists of a table containing apparatus for applying various forms of douches to different portions of the body, bath- and sitz- tubs, hot-air cabinets, massage-tables, hot- and ice- water tanks, weighing scales, etc.

Exercise.—There is too great a tendency toward absolute rest in the treatment of phthisis. The key-stone of successful treatment is conserving and building up the physical resources of the patient by climate, hygiene, diet, and an out-of-door life. Up to the present time all other agencies employed must properly be termed auxiliaries, the aim being to build up a solid physical condition, a hardy, resistant one.

Exercise, prudently carried out, is essential. All incipient tuberculars whose temperatures range below 100° F. should exercise freely and systematically. Where tachycardia or dyspnoea exists, the amount of exercise should be regulated by the physician.

TREATMENT OF COMPLICATIONS IN THE UPPER AIR-PASSAGES.—It is astonishing how large a percentage of even incipient cases of pulmonary tuberculosis present lesions of more or less severity in the upper air-passages, and it is a question whether quite a number of patients may not attribute their trouble,

primarily, to conditions of the nose or pharynx, which have, by reflex irritation, created a *nidus* for pulmonary infection.

It should be the invariable practice to examine the naso-pharynx and larynx of all tubercular patients the first time they are seen, whether or not there be subjective symptoms leading to the suspicion of disease of these parts. By these routine examinations, cases of chronic congestion or infiltration of the arytenoids are discovered early enough to be easily cured in nearly every instance by prompt local treatment. Unrecognized and left to themselves and climate, such cases, at least in a fair majority, either lead to fatal laryngeal conditions or are the indirect cause of prevention of cure of incipient pulmonary lesions.

Statistics show that not less than 25 per cent. of persons suffering from pulmonary tuberculosis have more or less involvement of the larynx and naso-pharynx. (See TUBERCULOSIS OF THE LARYNX.)

The naso-pharynx should be put in the best possible condition by frequent spraying with albolene solutions, followed by sprays containing such applications as may be individually indicated. Polypi must be removed; hypertrophic mucosa or turbinated bones may be reduced by fused nitrate, chromic acid, or suprarenal extract. Excrescences of a bony nature must be removed by operation. Slight laryngeal congestions yield readily to a cleansing spray, followed by a solution of alumnol, 10 to 20 grains to the ounce, or silver nitrate, 4 to 10 grains to the ounce. Chronic congestion and infiltration require, besides the cleansing by Dobell's solution, a local application of strong alumnol, of the strength of 25 to 50 per cent.; lactic acid, 20- to 25-per-cent. solution; silver

nitrate, 30 grains to the ounce, or the fused crystals. For ulcerations, good results may be attained by a spray of hydrogen peroxide, 50 per cent., followed by Dobell's to remove secretions. After this a direct application of either lactic acid, 20 to 25 per cent., or Chappell's creasote mixture. Sluggish granulations should be stimulated by fused nitrate.

Mucous tags remaining after removal of papilloma disappear under treatment with suprarenal extract. Tracheal ulcerations do well with intratracheal injections of argonin, 5 grains to the ounce, or a weak solution of silver nitrate.

SANITARIUM TREATMENT.—It is a conceded fact that, when possible to obtain admission to a properly-conducted and scientific sanitarium, the tuberculous improve more rapidly, and that the ultimate prognosis is more favorable than when treated under the best possible environment outside. Sixty-eight per cent. of wise and 38 per cent. of unwise patients recover from phthisis. Dr. Solly says: "Dr. Trudeau, Dr. Von Ruck, and Dr. Bowditch all believe that they can obtain better results, other things being equal, in the sanitarium than outside. My own personal experience in sanitarium treatment, though not sufficient to furnish statistics, confirms the opinion; and I believe the great hindrance in all climates to getting better results is due to the mistaken repugnance of most well-to-do patients to enter sanitariums, and to the criminal apathy of the State in neglecting to furnish them to the poor, so that their use is extremely limited. My observations as to the influence of prudence upon the prognosis of phthisis corroborate these opinions of the value of sanitariums."

Social surroundings, wise amusements, properly-arranged diet, hygienic surroundings, methods of prophylaxis and

intelligent care are all to be found in a more perfect condition in sanitariums than elsewhere.

Literature of '97-'98-'99.

From an analysis of the cottage sanitarium treatment of incipient tuberculosis as instanced by the Adirondack institution in New York, it is concluded that (1) tuberculosis, if diagnosed in its early stages, is curable in a large proportion of cases; (2) it is, therefore, of vital importance that diagnosis be made early; (3) the best results in treating incipient tuberculosis are obtainable by the open-air treatment in special sanitariums situated in good climates; (4) the best plan of construction for such sanitariums is the cottage-plan or some one of its modifications. E. L. Trudeau (*Practitioner*, Feb., '99).

In 95 per cent. of the cases of consumption seen by physicians the patients are unable to afford treatment away from their homes. Arrest or cure of tuberculosis is a question entirely of nutrition, and, of the measures by which the general nutrition of the body may be encouraged, the first and most important is fresh air. The following directions for home-treatment are given: The almanac is to be taken and the hours of sunshine counted. In winter two hours are to be cut off in the morning and one hour in the evening, and for the remainder of the day the patient must be out-of-doors. If there is no possible arrangement for life out-of-doors, the patient must be put in a room with southern exposure, and the bed moved into the sunshine, with the windows wide open. If there is a balcony or veranda with a good outlook toward the south it should be arranged for the patient; if not, a shelter can be put up in the yard at a very moderate cost. On a well-padded lounge covered with a couple thicknesses of blankets the patient sits or reclines all day. Only on blustering, stormy, or very rainy days is the patient to remain in the house. No degree of cold is a contra-indication. This continuous open-air life at rest is the most powerful influence possessed

to-day against the fever of tuberculosis. In any long series of cases the patients who do well are those who take plenty of food. Each case must be dealt with separately, but as large a quantity of food as possible should be given even, when possible, insisting on overfeeding, or stuffing. For some time personal patients have been urged to accustom themselves to take raw eggs, beginning with 1 three times a day, and increasing until they can take 20 to 24 a day. If broken into a cup and sprinkled with a little pepper and salt, the egg can be readily swallowed without breaking the yelk. William Osler (*Phila. Med. Jour.*, Nov. 25, '99).

Ideal rest-cure arrangement: From a large beach-chair of wicker-work the seat is removed and the inner walls are lined with padding. A reclining-chair is placed with its back in the interior and the whole arranged so that the patient is protected from the wind and sun. There the patient installs himself for the day. S. A. Knopf (*Med. Rec.*, Jan. 27, 1900).

Prophylaxis.—Prophylaxis is difficult in this disease, for the predisposing factors are numerous and often hidden. Marriage-laws prohibiting the union of physically debilitated persons would be of value, but at present are impracticable. Careful oversight of weakly children, or apparently healthy offspring of parents of suspicious physical ancestry, especially at certain periods of life, would do much toward removing the possibility of the inception of the tubercle bacillus. The children in the common school should be taught, and the public should be educated sufficiently, by means of tracts and circulars on the laws of hygiene and infection to enable them to protect their immediate persons and homes. Once having been taught these laws, the public should be forced to observe them.

Literature of '97-'98-'99.

The following measures are recommended for the prevention of consump-

tion: The careful inspection and testing of all herds of cattle, and the inspection of stables, and, until this is universal, the sterilization of all milk. To prevent the spread of consumption from persons suffering from the disease, all sputum should be collected in vessels containing some disinfectant, the contents to be burned or powerfully disinfected and thrown into water-closets. The Japanese pocket handkerchiefs may be used and immediately destroyed. All houses in which tuberculous cases have lived should be thoroughly disinfected after death. In families in which there is inherited susceptibility to tuberculosis all



Ideal arrangement for out-of-door treatment.

(S. A. Knopf.)

its members should live as far as possible in the open air day and night, summer or winter. William Broadbent (*Lancet*, Oct. 29, '98).

According to the official returns of the Leipzig abattoir for 1897, 36.40 per cent. of the 27,191 cattle slaughtered were more or less tuberculous. Nearly half (48.09 per cent.) of the cows were affected, while but a fifth (20.49 per cent.) of the bullocks and heifers gave evidence of the disease. Notwithstanding the large number of infected animals, only 2.08 per cent. were totally condemned as food. Of those more or less infected but passed as fit for food—that is, 97.92 per cent., all but a very small number were

allowed to be sold without any restrictions after the removal of the organs affected. The balance, 5.73 per cent., were first sterilized or sold as of second quality. Only eight sheep out of 49,559 were tuberculous. Of the swine, 132,062 in number, 2.78 per cent., and of the calves, 67,961 in number, 0.20 per cent., were more or less diseased. Editorial (Brit. Med. Jour., Jan. 28, '99).

The disease having been developed, there should be a partial isolation of the patient; we use the word partial advisedly, for great injustice is done daily to sufferers from phthisis by panic-stricken friends and relatives. If possible the patient should, in order to insure recovery and to remove every possible source of danger to others, be sent to a sanitarium; when this is not possible, or if the disease be in the incurable stage, the patient should be given a separate sleeping apartment and should avoid kissing or fondling members of the family; all dishes used should be sterilized after each meal, and, finally, all sputa should be gathered in a proper receptacle and cremated.

Literature of '97-'98-'99.

The following rules are useful, both to the consumptive and to his friends:—

1. Expectoration, in-doors, should be received into small paper bags and afterward burned.
2. Expectoration, out-of-doors, should be received into a suitable bottle, to be afterward washed out with boiling water, or into a small paper handkerchief, which is afterward burned.
3. If ordinary handkerchiefs are ever used for expectoration, they should be put into boiling water before they have time to become dry, or into some disinfectant solution to be ordered by the doctor.
4. Wet cleansing of rooms, particularly of bedrooms occupied by sick persons, should be substituted for "dusting."
5. Sunlight and fresh air are the greatest enemies of infection. Every con-

sumptive should sleep with his bed-room window open, top and bottom, and during the day should occupy a well-ventilated room. Rebreathed air is the main cause favoring consumption. If the patient is warmly clad he need not fear keeping out-of-doors in any weather. (N. B.: The patient himself is the greatest gainer by the above precautions, as his recovery is retarded and frequently prevented by renewed infection derived from his own expectoration.)

6. Persons in good health have no reason to fear the infection of consumption. Overfatigue, intemperance, bad air, and dusty occupations favor consumption. Gilbert Gordon (Canada Lancet, June, '99).

J. EDWARD STUBBERT,
JOHN D. RICHARDS,
Loomis Sanitarium,
Liberty, N. Y.

TUBERCULOSIS OF THE SKIN.

Under this head will be included the cutaneous affections in which bacillus of tuberculosis has been found. These may be subdivided into four main varieties: *true tuberculosis*, *miliary tuberculosis*, *lupus vulgaris*, and *lupus erythematosus*.

True Tuberculosis.—This is a form of primary tuberculosis due to contact with tubercular ulceration. It is, therefore, usually found on the lips, the vulva, or anus. It is characterized by small tubercular growths which gradually soften and become the foci of round or oval ulcerations. These are usually covered with sanious purulent discharge retained *in situ* and by the clear-cut edges of ulcers. When this discharge is removed, the bottom of the ulcer is found to be red; if left in place it becomes transformed into a grayish crust. The remedial measures indicated for lupus are also applicable here.

MILIARY TUBERCULOSIS OF THE SKIN.
—This disease, according to Kaposi, is much more frequently met with than one

would be led to suppose from the publications upon the subject, since he has seen twenty-two cases in his clinic and others in private practice. Clinically it is a well-defined disease, to be distinguished from lupus and all other tuberculous affections of the skin. It occurs almost entirely in individuals suffering from some other form of tuberculosis, usually of the lungs, but by no means only in the last months of life of such persons or in acute miliary tuberculosis of internal organs. Tuberculosis of the skin is very often associated with a like affection of the neighboring membranes, primarily or secondarily. Spontaneous healing may take place or it may follow appropriate local treatment.

Many of the cases are distinctly traceable to autoinoculation, while in some the inoculation seems to have originated from without. Whatever be their origin, they are due to the introduction of the tubercle bacillus into the skin. The cutaneous manifestation is often inaugurated by an intense itching, which the tuberculous patient scratches and probably inoculates. Warty or papillomatous granulations then appear, which spread superficially, become ulcerated, etc., and otherwise assume a character recalling lupus. This form may proceed to spontaneous healing after a few months, and is apt to yield with more promptness to the measures indicated for lupus (*q. v.*).

Simple tubercular ulceration of the skin must not be confounded with lupus; this condition usually exists in connection with breaking-down caseous glands, but may also arise from a cutaneous tubercular abscess. There is more ulceration of the deep parts with induration of the skin than in lupus: the edges, too, are undermined, and there is no tendency to cicatrization without ulceration, and the neighboring lymphatic glands are enlarged.

The disease is easily cured by scraping,

and has not the same tendency to recur after apparent cure. Leonard A. Bidwell (Indian Lancet, Feb. 16, '96).

Lupus Vulgaris.

This affection is now recognized as a tuberculous lesion of the skin or mucous membrane, or both, which may proceed to ulceration (*lupus exedens*), observed in young subjects—*i. e.*, from infancy to about the thirtieth year—or not, *lupus exfoliativus*, in which thin scales are thrown off from the lesion, also a tuberculous one.

Symptoms.—In both varieties lupus begins in the form of yellowish-red or copper-colored projections or blotches varying from the size of a millet-seed to that of a split pea. At times these blotches disappear under pressure (*lupus plan*). When in the form of tuberculous nodules, they may, though rarely, become aggregated into patches which, by coalescing, in turn cover extensive surfaces; but, as a rule, they do not; they are indolent, soft, and elastic, and sometimes slightly sensitive to pressure. When they become the seat of several blood-vessels, they assume the form known as the myxomatous lupus, and, when exceedingly vascular, the angiomatic lupus. Their progress is exceedingly slow. When the tubercles break down and ulcerate, they become covered with scabs, overlying a bed of sanious pus; under this the ulceration gradually extends, eating its way in all directions. The neighboring tissues are slightly tumefied, and a narrow, reddish areola is usually present. After a certain time, the ulceration involves the deeper structures, and all tissues—muscular, cartilaginous, tendinous, etc.—are gradually invaded. The mucous membrane of the nose, mouth, pharynx, larynx, and the conjunctiva are often gradually included in the destructive process, and deformi-

ties of the nose, mouth, lids, etc.; result. Unfortunately, this terrible disease shows a distinct predilection for the face, though it may also develop in the skin of the limbs, buttocks, and trunk. Again, the ulcerative form almost invariably attacks the nostrils, internally or externally, destruction of this organ being but a matter of time unless the disease is mastered.

In the non-ulcerative variety the tubercles remain practically stationary, then flatten out, and leave in their stead a wrinkled surface, which, as stated, becomes exfoliated, and ultimately disappears, leaving in its stead a small cicatrix.

The many forms which lupus may assume have suggested an equal number of subdivisions. When the destructive process advances with great rapidity, destroying everything in its wake, it is termed *lupus vorax*; when the suppuration is slight and the lesion is hard, verrucose, or papillomatous, it is termed *lupus verrucosus* or *papillomatosus*; when the affected tissues are greatly thickened and deformed, it is termed *lupus hypertrophicus*, etc.

All the forms of lupus, with the exception of *lupus vorax*, progress slowly. It may, after a period of slow development, become stationary and even recede until complete recovery is attained. This is rarely observed, however. A peculiarity of the disease is its tendency to become complicated with other cutaneous disorders: erysipelas, adenitis, epitheliomatous cancer, etc.

Literature of '97-'98-'99.

Marked increase of the interpapillary prolongations of the rete are common in lupus vulgaris; but in infrequent cases the tuberculous tissue or the cicatrix at the site of an old tuberculous lesion becomes the seat of actual epithelioma. Desbonnets, who has recently studied this subject, was able to collect the re-

ports of eighty-six cases in which epithelioma occurred either in the lupous tissue itself or in the scar of lupus, but in only a single one of these cases was the verrucose form of tuberculosis cutis associated with epithelioma. According to this author, this form of epithelioma may assume the vegetating or ulcerative form, and is more rapid in its progress than that occurring in non-tuberculous tissue. M. B. Hartzell (Jour. Amer. Med. Assoc., Apr. 16, '98).

Diagnosis. — Lupus vulgaris may be confounded with tertiary syphilis, epithelioma, rodent cancer, and scrofuloderma. The syphilitic eruption most likely to be mistaken for lupus is a subcutaneous gumma, which after a time ulcerates and becomes covered with a scab; this heals and others form just beyond, advancing in a serpigenous manner. A scar is formed which resembles lupus, except that there is pigmentation around the patch, and the cicatrix is thinner, softer, and less fixed than lupus.

Epithelioma is more painful, progresses more rapidly, and is liable to hæmorrhages; lymphatic glands in the neighborhood and the deeper structures are invaded. The edges of the ulcer, too, are raised and hard. Rodent cancer arises late in life, the edges of the ulcer contain no nodules; and there are no granulations on the ulcer. It is always single, and does not cicatrize spontaneously. (Bidwell.)

Literature of '97-'98-'99.

No case of cutaneous disease should be considered tubercular until the presence of tubercle bacilli has been demonstrated. The best plan for detecting the presence of tubercle bacilli in lesions of the skin is by a smear taken from the lesion on a slide, then dried and stained in the usual way. There is a much better chance of finding the organism by this method than seeking for them in sections.

In numbers of cases there is a great similarity between tubercular and syphilitic lesions of the skin, and one can then only make a diagnosis by further examination for the presence or absence of tubercle bacilli. In the sections from miliary gummata the pathological picture is very like that of a typical tubercle. Tuberculin has been used in the Johns Hopkins Hospital with negative results. Gilchrist (*Jour. Amer. Med. Assoc.*, Apr. 16, '98).

Pathology.—Walker divides the commoner varieties of lupus into three forms: 1. The ulcerating form, which is most common on the face; the affected area is covered with granulations, giving rise to a purulent discharge, which dries up into a crust. The granulations of this form differ from the granulations of an ordinary ulcer in that they are covered by epidermis. The epithelial cells are swelled, degenerative, and allow the passage of serum and leucocytes. This is due to the secondary inoculation of organisms other than the tubercle bacillus. 2. The form in which no ulceration occurs, a miliary tuberculosis of the skin, which presents multitudes of little tubercle-follicles which constitute the apple-jelly nodules. If a sufficient number of nodules run together, the epidermis is lost, and the area, becoming inoculated with other organisms, gives rise to the form of the disease just mentioned. 3. The fibrous form, in which the patch is usually single, and varies in size from a sixpence up to six inches in diameter. The skin is thickened and red and often scaly. No tubercle can be made out on account of the diffuse redness which masks them.

Prognosis.—The recent contributions to our knowledge of lupus have somewhat improved the chances of recovery; but the disease remains a difficult one to overcome, and sometimes seems to baffle all efforts. Again, it may apparently yield

to appropriate treatment and suddenly reappear—all features which should suggest reserve when the physician is asked to express his views.

Treatment.—An important feature of the treatment of lupus vulgaris is attention to the general health. It is a tuberculous affection and, therefore, associated with general vital depravity. Out-of-door exercise, wholesome food, tonics, etc., tend greatly to assist the local measures by increasing the powers of resistance of the tissues to bacillary invasion.

The reports of numerous operators have shown that many cases of lupus can be cured by radical excision and with good cosmetic results. This mode of treatment should be undertaken at the earliest possible moment. The incision should be made in healthy tissue, at least 1 to 2 centimetres from the infected area, and the tissues thoroughly curetted off. A. Buschke (*Berl. klin. Woch.*, No. 21, '98) states that if there is any doubt as to how far the tissues are infected, the tuberculin test should be employed. A plastic operation, to cover the defect, should then be resorted to.

SURGICAL TREATMENT.—The following procedure has been practiced in thirty-five cases of lupus in Lang's clinic in Vienna. Most of the operations were done under local anæsthesia. An incision is made all round the affected tissues about one-half inch beyond the margin, and the diseased portion of skin is dissected up, very great care being taken to avoid leaving behind any of the tissues affected with lupus. The wound is covered with Thiersch grafts, taken chiefly from the outer side of the thigh. A piece of dry aseptic gauze is then placed on the part and fixed with collodion. This is left untouched for four or five days, then dressed in the same way and

left for the same length of time, and then an ointment may be applied.

Cicatricial contraction may lead to some deformity; but, if this occurs, nothing should be done until after the lapse of several months, when the contraction has reached its maximum. Seven of the patients were under observation for various periods ranging from eighteen months to four years after treatment had ceased, and no recurrence took place, and many others a shorter time with an equally good result; but in four cases a rapid return occurred. C. Popper (*Derm. Zeit.*, vol. iv, Parts 1 and 2, '97).

Literature of '97-'98-'99.

Forty-seven cases of lupus of the face personally treated by complete excision. The incision should always be made about a centimetre from the edge of the disease, and then the diseased patch is dissected up, the superficial half of the subcutaneous fatty tissue being removed with it. If the whole of the subcutaneous fatty tissue be removed, an unsightly puckered scar is left. The hæmorrhage must be arrested by pressure or by torsion. Any affected glands should be removed also. The transplantation of skin may follow immediately after the removal of the diseased tissue. One large flap is preferred, and this is placed on the wound, so that the edges of the flap extend beyond the edges of the wound; the flap is fastened in position by stitches, and is covered by sterilized gauze. Ferd. Schulze (*Wien. klin. Rund.*, No. 37, '98).

TUBERCULIN. — Koch's new T-R tuberculin has been used with considerable success by several dermatologists. Koch advises that a small dose ($\frac{1}{500}$ milligramme) be first used, and that this be as rapidly increased as possible, avoiding any constitutional reaction, and not repeating the injection until the temperature has fallen to the normal point or near it. Twenty milligrammes should constitute the dose to be reached if possible.

Literature of '97-'98-'99.

Six cases of lupus vulgaris treated by Koch's new T-R tuberculin described. Koch said he had invariably seen a considerable improvement take place. The writers confirm the statement and even found the improvement in some cases remarkable. None of the cases so far have gone on to a cure. The constitutional disturbance was comparatively slight and transitory and in no case severe. The local reaction also was temporary and not very severe. Malcolm Morris and Arthur Whitfield (*Brit. Med. Jour.*, July 24, '97).

In four cases in which the new tuberculin was used Leslie Roberts (*Brit. Med. Jour.*, Jan. 15, '98) noticed that the effect was most marked when the lymph- and blood- vessels most actively participated in the tuberculous process. In the dry, non-irritative form of the disease, when the tuberculous nodules seemed to be more or less isolated by inert disease, the improvement was far less obvious. The local changes consisted in shrinking of the tissues in the immediate vicinity of the tubercles, and in an arrest and healing of ulceration. The reduction of œdematous swelling of the lips and gums was very remarkable.

Literature of '97-'98-'99.

Tuberculin gradually applied is never hurtful, and it is useful in resolving lupous or tuberculous infiltrations of long standing. Before applying tuberculin, it is necessary to get rid of any septic phenomena which may be present. The use of the thermocautery at the same time is advisable to destroy any nodules as soon as they appear. Campana (*Il Policlinico*, Feb. 1, '98).

When the above means cannot be resorted to, lactic acid is probably the best agent at our disposal. The crust having been, if possible, removed, the parts are sprayed with a 4-per-cent. solution of cocaine, and the edges, after three or four

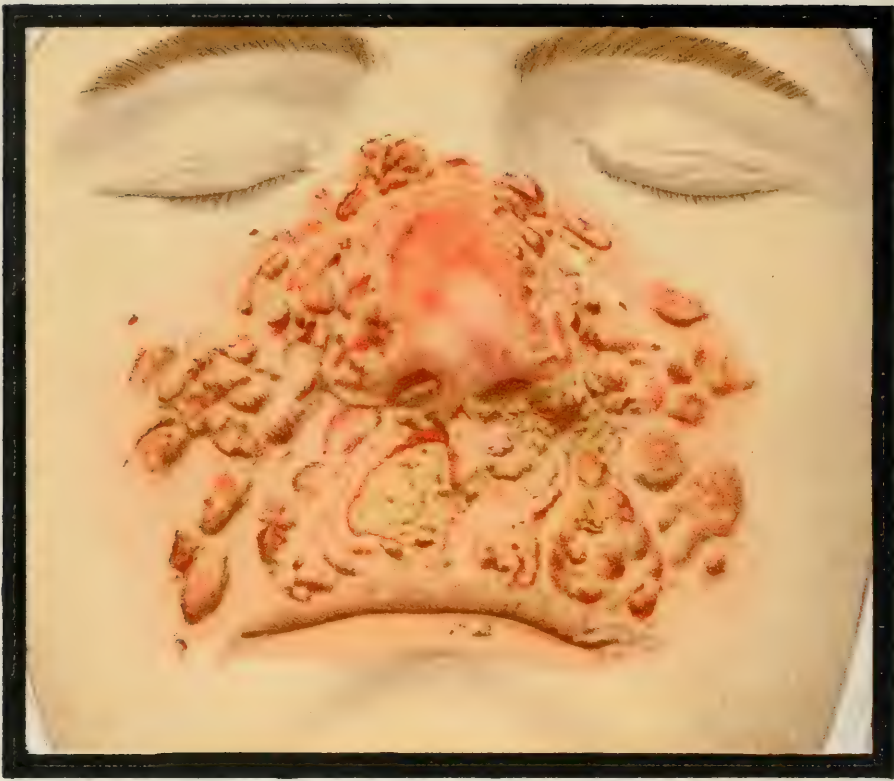


Fig.1 Lupus Vulgaris (Besnier.) Fig.2 Lupus Erythematosus (Hallopeau.)
Le Musée de l'Hopital St. Louis. Published by Rueff & Co. 106 Boulevard St. Germain, Paris.

minutes, are carefully moistened with the acid, using a small cotton pledget or a camel's-hair pencil for the purpose. Galvanocautery may be used, but it is, as a rule, more objectionable to the patient. Lysol applied pure has been recommended. The thyroid preparations have recently been tried with apparent success, but in doses which appear, at least, dangerous.

Three cases of lupus in which favorable results followed thyroid extract administered for a long period. Two of the cases believed to have been permanently cured in one year. Dose required is larger than for myxœdema. J. Barclay (Brit. Med. Jour., Oct. 24, '96).

Literature of '97-'98-'99.

Good results with thyroid extract in two cases of lupus. By degrees one case took as much as 75 grains; the other 90 grains daily, but later about 15 grains was the dose administered. Treatment was continued over a period of eight months, both cases then being absolutely well. F. G. Proudfoot (Brit. Med. Jour., Jan. 2, '97).

N. R. Finsen (Sem. Méd., No. 59, '97) has recently obtained good results by means of a simple apparatus: the rays—either sunrays or electric arc-rays—concentrated on patches of lupus.

According to J. Rudis-Jicinsky (Amer. X-ray Jour., Oct., '98), the Roentgen rays constitute the best means for producing artificial inflammation, and converting unhealthy ulcerations into open healthy granulations, followed by cure.

Lupus Erythematosus.

This form of lupus is not believed to be tuberculous, as a rule, but the tubercle bacillus has been found in some cases and the disease can therefore be considered in this section.

Case of a woman, 67 years old, who had had lupus erythematosus of the face for seven or eight years, associated with suppuration of the cervical lymphatic

glands. Pus drawn from the glands was found to contain tubercle bacilli in great numbers. Leredde (Med. Week, Jan. 22, '94).

Not all cases of lupus erythematosus are due to the tubercle bacillus, but in some cases this organism may act as an exciting cause. Brooke (Brit. Jour. Derm., Mar., '95).

The earliest appearance of lupus erythematosus, as described by L. A. Bidwell, is a patch of redness around the opening of a sebaceous gland. This gradually spreads in size, and the surface becomes scaly, the margin is defined, and slightly raised; the spots coalesce, and new ones form which, in their turn, join the older ones. When of any size the patch becomes covered at its centre by thick shagreen-like scabs, which, when forcibly detached, bear on their under surface dried columns of epidermic cells which have been pulled out of the dilated openings of the sebaceous glands. The disease often becomes stationary after spreading to a considerable extent; the margins then lose their bright hue, and a depressed punctate scar remains. When hairy parts have been affected, permanent baldness results from destruction of the hair-follicles. (*See colored plate.*)

This form of lupus is seen on the face more often than elsewhere, and tends to be symmetrical. Starting on the nose or one cheek, it spreads in both directions, and in severe cases resembles a butterfly, the wings on the cheeks and the body on the nose. Other patches appear on the lobules of the ears, and occasionally on the forehead; they also are seen on the backs of the hands, but seldom on the feet.

Lupus erythematosus attacks people with feeble circulation such as are liable to chilblains, etc., and it chooses for its starting-point a part where the blood-

supply is poor and where there is little subcutaneous fat: *e.g.*, the nose, or ear. The eruption can sometimes be traced to exposure, to great heat, or to cold. It is more common in females than in males.

Literature of '97-'98-'99.

It seems that the tubercle bacillus in the skin is somewhat modified, has not much tendency to multiply, and is not easily inoculable. The derma does not offer to this bacillus a fertile ground and its infectious properties remain limited to the skin, without showing general infectious phenomena. At times the infectious power of this germ, when capsulated in the tissues, may remain latent for years, ready to break out at any time in the form of lupus from old scars. A. Ravogli (Jour. Amer. Med. Assoc., Apr. 16, '98).

Diagnosis. — Hallopeau (Annales de Derm. et de Syph., Nos. 8 and 9, '96) states that the tuberculous nature of any cutaneous affection may be affirmed from the presence of any one of the four following characteristics: (1) the possibility of transmitting tuberculosis by the serial inoculation of morbid products; (2) the presence of the characteristic bacilli in the affected tissue; (3) intra-inoculation — *i.e.*, the production of a dermatosis by the proliferation of alterations clearly tuberculous, and, reciprocally, the production of tuberculosis consecutively to the development of this dermatosis; (4) the appearance of differential eruptions, such as lichen scrofulosorum, under the influence of inoculations of tuberculin. The forms of cutaneous tuberculosis due to bacilli are the sclerotic lupus, or tuberculosis verrucosa (Riehl and Paltauf); anatomical tubercle; tuberculous gumma; tuberculous tumor; tuberculous ulcer; suppurative tuberculouses.

Treatment. — Many cases of lupus erythematosus can be cured, according to

Unna (Jour. Cut. and Genito-Urin. Dis., Oct., '98) by the sole use of external applications. Among the external remedies which he has seen to do most good is the following prescription:—

℞ Zinci ox.,
Boli rubræ, of each, 30 grains.
Boli albæ,
Magn. carbon., of each, 45 grains.
Amyli, 2 1/2 drachms.—M.

Another one which, long continued, he has found to be followed by a cure in a number of cases, without the help of any other remedy, is a combination of soap collodion, as in the following formula:—

℞ Collodion, 5 drachms.
Sap. virid., 1/2 to 1 drachm.—M.

The same clinician frequently employs medicated collodion painted over the affected area from two to four times a day. The collodion used for the preparation must have a neutral, not an acid, reaction.

℞ Saponis viridis, 2 to 4 parts.
Collodii flex., 20 parts.—M.

℞ Saponis viridis,
Ac. salicylici, of each, 2 parts.
Collodii flex., 20 parts.—M.

To be used if the skin shows much irritation:—

℞ Ichthyol, 5 parts.
Collodii flex., 20 parts.—M.

Literature of '97-'98-'99.

Cases of lupus treated by calomel injections. In 37 cases there were positive results, in 10 negative. The dose of each injection was 1 cubic centimetre of emulsion of calomel in olive-oil (1 in 10). Six injections were given in eight days. Bernstein (Münch. med. Woch., Nov. 15, '98).

In two patients with erythematous lupus who have been treated with alcohol there is a distinct retrogression of the disease. Where the disease was

slight, as upon the ear and the cheek, it has completely disappeared; at the inner canthus, which is less accessible to treatment, the retrogression is less marked. Hebra (Archiv f. Derm. u. Syph., B. 48, H. 1, '99).

Case of lupus erythematosus in which lotions of sulphate of zinc, sulphide of potassium, and sulphur were used without improvement. Iodoform was then given in the form of pills containing 1 grain, after meals, the lotion being continued.

At first the eruption got worse, but by the end of the third week the itching and the inflammation began to subside, and in three months the disease had completely disappeared. Whitehouse (N. Y. Med. Jour., Feb., '99).

TUMORS.—The word "tumor" literally means a swelling, but in this article it is employed in its more restricted sense: a neoplasm or new growth. As so used, it may be defined as a non-inflammatory mass of autonomous tissue, having an atypical structure and indefinite growth, and being useless for any known purposes of the human economy.

The term "tumor" does not then include the infective granulomata, which are due to specific organisms, parasitic cysts, inflammatory aggregations of cells, and hypertrophied tissues. Pure retention cysts do not properly belong here either, unless they are associated with proliferation of their frame-work. If it should be definitely shown that any variety of cancer were due to a specific agent, it should then be no longer classified among the tumors.

In speaking of tumors certain terms are used which should be clearly understood. Neoplasms are said to be *heterotopic* when they are formed of tissues different from those in which they occur; *heterochronic* when the tissue composing the tumor occurs at a period of life when such tissue

should not exist in the body; and *autonomous* when tumors are governed by their own laws, without reference to other parts of the body, and thus possess independent functions.

Telangiectasis refers to a condition in which the terminal portions of arteries, the capillaries, or the commencing parts of the veins are dilated and overfilled with blood, the process not being attended with the usual signs of inflammation. The term *scirrhous*, which means, literally, hard, is applied to an indurated tumor, the term being especially used in connection with cancers. In these cases the connective-tissue elements predominate over the cellular constituents. The opposite term is *encephaloid*, medullary, or soft.

If a tumor is made up of two kinds of tissues, the variety which predominates in quantity or importance is named last. Thus, a tumor of the uterus composed one-third of unstriated muscular tissue and two-thirds of fibrous tissue would be called a myofibroma. A tumor which contains any elements of sarcomatous tissue, however, should have the word sarcoma as the terminus of its name.

By *metastasis* is meant the removal of characteristic portions of the tumor to some other part of the body and their independent growth in that situation, the daughter-growth possessing more or less the characteristics of the primary lesion. *Infiltration* is the diffusion of the constituents of a tumor into the surrounding tissues or cavities.

Tumors are called *malignant* if they possess the properties of recurrence, metastasis, or infiltration and destruction of the neighboring tissues; *benign*, or innocent, if they grow slowly, permitting the adjacent organs to adapt themselves more or less completely to the presence of the foreign body, and lacking the

properties just enumerated as belonging to malignancy. The situation of a new growth may determine whether it is malignant or not. Thus, a tumor infiltrating the brain might so derange cerebral functions as to render it malignant, while if situated in the foot it might remain a localized affection, only interfering with locomotion.

surrounding tissues, but the infiltration is sometimes revealed only by microscopical study.

Tumors may vary in weight up to 165 pounds or more. Their growth may be rapid or slow, covering a period of many years, with remissions and exacerbations. Different kinds of tumors may be found in the same organ. It is even possible

TABLE OF MACROSCOPICAL DIFFERENCES BETWEEN BENIGN AND MALIGNANT TUMORS.

Benign Tumors.

1. Are homologous and typical.
2. Are rich in fibres and poor in cells.
3. Grow centrally and comparatively slowly.
4. Have a capsule.
5. Are usually poor in blood-vessels, except angioma.
6. Are usually fair in consistence and dry, except myxoma.
7. Seldom ulcerate, except lipoma.
8. May grow large and grow upward.
9. May be primarily multiple.
10. Do not recur after removal.
11. Give no metastasis.
12. No cachexia.
13. May kill mechanically by weight, pressure, hæmorrhage, etc.
14. Prone to calcareous infiltration and fatty degeneration.

Malignant Tumors.

1. Are heterologous and atypical.
2. Are poor in fibres and rich in cells.
3. Grow peripherally and comparatively fast.
4. Are not capsulated.
5. Are rich in blood-vessels, except hard cancer.
6. Are soft and juicy.
7. Often ulcerate in tumor itself.
8. Seldom grow large, except sarcoma springing from bone. Grow principally downward.
9. Not primarily multiple, except melanotic sarcoma.
10. Do recur after removal.
11. May give metastasis.
12. Cancer gives a cachexia, especially when the metastasis has taken place.
13. Kill by infiltration and destruction of the surrounding tissues.
14. Prone to colloid and telangiectatic changes.

General Considerations.—Tumors occur in all tissues, at all ages, and in all parts of the body, and are formed of cells which are more or less like those of normal tissue occurring during either intra-uterine or extra-uterine life. They receive their blood-supply by connections with previously existing channels, which develop from sprouts formed by the proliferating cells of the old blood-vessels. A round-celled infiltration is common. Division of cells takes place mostly by karyomitosis, which may be irregular in character. Tumors can usually be differentiated by the naked eye from the

for a cancer and a sarcoma to exist as independent growths in the same person. Thus, Coley (*Annals of Surgery*, Apr., '98) describes a case of cancer of the breast co-existing with sarcoma of the submaxillary region. Williams has collected 11 such cases, and there are more of them to be found scattered throughout medical literature. Lannois and Courmont (*Rev. de Méd.*, '94) give an interesting account of two primary cancers occurring in the digestive tract of the same individual. Tumors, no doubt, have an internal secretion, though this secretion is of no use to the system. In

rare cases a neoplasm may secrete one of the normal juices of the body; for example, a tumor of the liver may produce a multiplication of the bile-ducts and biliary tubes which are capable of functioning, or an ovarian tumor may form colloid material. Beyen reported, in December, 1899, to one of the sections of the College of Physicians of Philadelphia, a case of ovarian cyst associated with undoubted diabetes, in which removal of the tumor caused a disappearance of the glycosuria and other diabetic symptoms.

The shape of a tumor is influenced by its character, method of growth, situation, mechanical pressure, etc. Tumors may appear as uniform swellings, flat tabular swellings, tubers, nodes, or as fungoid, polypoid, papillomatous, dendritic, mushroom-like, sessile, pedunculated, cauliflower-like masses.

When tumors are deep-seated, we have:—

1. Uniform swelling: (a) glioma; (b) lymphoma; (c) lymphangioma; (d) sarcoma; (e) rhabdomyoma; (f) lymphosarcoma.

2. Nodes growing centrally: (a) fibroma; (b) myoma; (c) myofibroma; (d) myxoma; (e) adenoma; (f) osteoma; (g) chondroma; (h) secondary cancer and sarcoma.

3. Nodes growing peripherally: (a) primary sarcoma; (b) primary carcinoma.

4. Cysts: (a) retention; (b) extravasation; (c) exudation [as ovarian and parovarian]; (d) softening; (e) parasitic; (f) dermoid.

When on the surface they appear as:—

1. Flat tabular swelling: (a) keloid; (b) angioma; (c) lymphangioma; (d) squamous epithelioma; (e) cholesteatoma; (f) sarcoma of serous membranes.

2. Tubers (a partly projecting node):

(a) osteoma; (b) chondroma; (c) osteochondroma; (d) giant-cell sarcoma.

3. Fungi (*fungus hæmatoides*): (a) soft cancer; (b) telangiectatic sarcoma; (c) cavernous angioma.

4. Polyps: (a) myxoma; (b) soft fibroma; (c) lipoma; (d) adenoma; (e) sarcoma of serous sacs.

5. Dendritic: (a) warts; (b) papilloma; (c) epithelioma.

6. Papillæ: (a) horns; (b) corns; (c) condyloma.

It is at times impossible from microscopical study alone to tell a sarcoma from granulating tissue. In one well-known case the ulcerating area of a lipoma was diagnosed as malignant, the leg was amputated, and death resulted. We cannot always distinguish sarcoma, such as an endothelioma, from a cancer, an adenocarcinoma from an adenoma, or an adenoma from an hyperplastic glandular structure.

Etiology.—1. A first group of tumors may be regarded as being composed of congenital deposits of tissue in an abnormal situation or of rests of tissue which do not disappear in the course of development (Cohnheim's theory). These patches are usually present at birth and develop in later life. To this group belong many varieties of osteoma, chondroma, angioma, lipoma, fibroma, sarcoma, adenoma, cysts, and teratoid tumors. The latter may originate in a transposition of tissue-cells, in the implantation of a rudimentary portion of a twin, or in the pathological growth of male or female cells of generation.

Literature of '97-'98-'99.

Osteoma is, for the most part, to be explained on embryonal grounds (Cohnheim). It is often seen as an exostosis in the neighborhood of an epiphysis or as an ossification of some cartilaginous "rest"; in many other cases it is the

result of traumatic osteoperiostitis, or of syphilis or rachitis.

Chondroma is most common in infancy and childhood, and its consideration is practically inseparable from that of rickets. Such cartilaginous tumors as are not to be explained as expressions of rachitis are to be regarded as inclusions, according to the embryonal theory of Cohnheim. Roswell Park (*Amer. Jour. Med. Sci.*, May, '98).

2. From 14 to 17 per cent. of all tumors arise after an injury, though, no doubt, some of these cases owe their development to the irritation by the traumatism of embryonal rests pre-existing in the body. Out of one hundred and seventy cases of sarcoma collected by Coley (*Annals of Surg.*, Sept., '97), 27 per cent. gave a history of trauma; in one case the tumor appeared within a week after the injury. Such a case raises an interesting question as to the liability of an accident insurance company. While Coroner's Physician of Philadelphia a body came to me for autopsy in which there was doubt as to whether a kick might have given rise to a cancer of the large intestine (Virchow's theory).

3. Tumors follow inflammations, especially ulcers which have resulted in extensive cicatrization. Thus, an epithelioma may develop from lupus; a keloid, especially in the colored race, from a scar; or a cancer at the border of a gastric ulcer. Cancer may also occur in the floor of a tuberculous or syphilitic granulating area, and an adenocarcinoma in the large intestine from a healing or healed typhoid ulceration.

Study of the relation of traumatism to malignant growths based on 328 cases of carcinoma and 171 of sarcoma observed in the surgical clinic in Munich during the last five years. Of the 328 cases of carcinoma, 117 were in men and 211 in women; and of 171 cases of sarcoma, 81 were in men and 90 in women. After deducting tumors of the mamma and geni-

tal organs there were 108 tumors in men and 102 in women. In the carcinomata there was a history of a single trauma 92 times. In the sarcomata a single trauma was noted 35 times, and 32 times there was a history of chronic irritation (including warts). Some cases of single trauma seem to stand in doubtful relation to the formation of the tumor, but, as a rule, the new formation has been occasioned by injury. Virchow's theory of the high percentage—25 per cent. for single trauma, and 18 per cent. for continuous irritation—is adopted. Ziegler (*Münch. med. Woch.*, Nos. 27, 28, '95).

The fundamental phenomenon underlying the development of cancerous or other neoplasms is the assumption of a habit of growth, of rapid cell division, by certain cells independent of external stimulus. In man chronic irritation of moderate intensity causes a proliferation of cells of highly organized tissues with the assumption of an embryonic type, and this at times doubtless passes on into cancer. The only distinction between the inflammatory and cancerous growths is that in the former the abnormal growth ends when the cause of irritation is removed, while in the latter the cells have gained the habit of unrestrained growth from frequent and rapid multiplication in a somewhat embryonic state. Among the factors which may possibly be concerned in the production of the habit of growth are increased nutrition, modified nerve-control, chronic irritation, and parasitic action. Parasites may be, at most, one cause, by producing chronic irritation. After the climacteric, when the absorption of certain components of various tissues occurs, other portions receive increased nourishment; and especially where by injury, possibly years previously, a certain amount of instability has already been introduced, we have a condition particularly favorable to irregular and sub-adult cell-growth. J. G. Adami (*Montreal Med. Jour.*, Feb., '96).

Literature of '97-'98-'99.

The connection between cancer and injury is not an immediate one, but con-

sists rather of an unbroken series of morbid phenomena, each of which is dependent on its predecessor. Berger (*Viertelj. f. gericht. Med. v. öffentl. Sanitäts.*, xiv, i, '97).

One hundred and seventy cases of sarcoma personally examined with a view to determine the frequency of trauma as an exciting cause. Out of these, 46, or 27 per cent., followed injury; 18 of these were osteosarcoma and 26 affected the soft parts. The sarcomas were round-celled in 29 cases, spindle-celled in 5, melanotic in 5, cylindroma in 1, chondrosarcoma in 2, mixed in 3, and doubtful in 2 cases.

The intervals of time between the injury and the development of the sarcoma were: Within a week in 8 cases; from 1 to 4 weeks in 10 cases; from 4 to 8 weeks in 6 cases; from 2 to 6 months in 7 cases; from 6 to 12 months in 4 cases; i.e., 24 out of the 46 cases developed within 2 months after the injury.

The nature of the injuries included blows, falls, contusions, fractures, sprains, lacerations, burns, shot wound, and abrasions.

Assuming that sarcoma is due to an infectious micro-organism (which is not unlikely), the explanation of sarcoma following injury is easy. W. B. Coley (*Annals of Surg.*, May, '98).

Fibromata are usually of traumatic origin, and, if careful investigation be made, the majority will be found to contain minute foreign bodies, such as splinters, splinters, etc., which have served as the exciting cause. This is especially true of those fibrous tumors found about the hands and feet.

The lipomata find their explanation in some disturbance of nutrition due to faulty innervation. They are usually of traumatic origin. The injury has usually been so slight and so long past as to be forgotten. Lipomata are frequently multiple, and then usually symmetrically placed, and such distribution can be explained only through the agency of the nervous system. Roswell Park (*Amer. Jour. Med. Sci.*, May, '98).

4. The fourth group consists in the overgrowth of some constituent of the body while the contiguous tissue is un-

dergoing senile atrophy. For example, some epitheliomata which occur in old age are due to the fact that the epithelial cells have not lost their power of proliferation, while the connective tissue is undergoing atrophy and seems to be no longer able to protect the tissues underneath from the ingrowth of the epithelial cells.

5. Ribbert believes that a separation of cells or a group of cells from the organic (nervous) control of the tissues in which they are normally found is the determining factor in the production of a tumor. This loss of control may take place either by disturbances in intra-uterine development, or, later on, by the influence of external agents. And yet this very thing frequently occurs and no tumor develops, but rather atrophy of the tissue. A portion of thyroid gland introduced into the breast of a patient suffering from myxoma gives rise to a certain amount of curative action, but the piece of gland inoculated quickly atrophies and entirely disappears.

When the complexity of the human body is considered, it seems surprising that outgrowths of tissues in the form of tumors are of so infrequent occurrence. Is there somewhere in the nervous centres a working model of the body, which by an unknown force is so controlled that there is departure from the normal shape without an assignable cause?

6. There can be but little doubt that some varieties of tumors, such as papilloma and cancers, are due to infecting agents received into the body from without. At the present time no such organism has, however, been demonstrated.

Irritation alone cannot be the cause of cancerous tumors, or else they would occur more frequently. Parasites frequently cause cell proliferation independent of inflammatory conditions, as shown by the lymphomata of typhoid

and the enlarged spleen of malaria, a proliferation analogous in general features to cancer; they produce metastases as does cancer; they often select special cells for their habitat, as blood-cells in malaria, multinuclear leprosy cells in leprosy, and giant cells in tuberculosis, while the hypothetical cancer parasite may equally well choose epithelium. Finally, certain parasites, coccidia, cause in the bile-ducts of rabbits an increase of epithelial and fibrous tissue closely resembling malignant adenoma of the rectum. C. F. Martin (Montreal Med. Jour., Feb., '96).

In reviewing the present state of knowledge as to the etiology of cancer the following propositions are advanced: That in malignant growths of men and animals certain extraneous bodies may be found within the protoplasm of the cell. These bodies are identical morphologically with the so-called coccidia found by various authors in the cells of epitheliomata and sarcomata. They are blastomycetes, and resist acids and alkalies just as these parasites do. They are found in malignant growths only and in no other pathological growth. They are generally seen at the growing edge of a new growth, not in the centre, and only exceptionally in the cell-nuclei. They react to special methods of staining, and may be obtained in pure cultures from the malignant neoplasms of men and animals. The lower mammalia (guinea-pigs, rabbits) are more susceptible to inoculation with these blastomycetes than the higher (dogs). Thus, while certain blastomycetes in the lower classes give rise to generalized lesions, in the higher mammalia the lesions are localized. These lesions have essentially neo-productive and non-inflammatory characters. The question of the etiology of cancer can be resolved only when the blastomycetes isolated from malignant tumors of animals of one species reproduce in animals of the same species the same malignant growths. Roncali (Suppl. al Policlin., Oct. 31, '96).

Literature of '97-'98-'99.

All the so-called parasites which have, up to the present, been described as oc-

curring in cancers are susceptible of explanation as degenerations of one or all of the constituents of tumor-cells or as metamorphosis of their secretion. H. J. Stiles (Lancet, Feb. 27, '97).

The following deductions may be made from personal observations and experiments:—

1. That in cancers there are certain intracellular bodies (which may also be found rarely outside the cells) which are neither parts of the cell structure nor any known degenerative change, and which are only found in cancer; and that they are only found at the periphery of the growing parts of a cancer, and not in the degenerated parts, and that these bodies have distinctive microchemical reactions.

2. That there are certain cancers, which occur rarely, in which these bodies are present in enormous numbers.

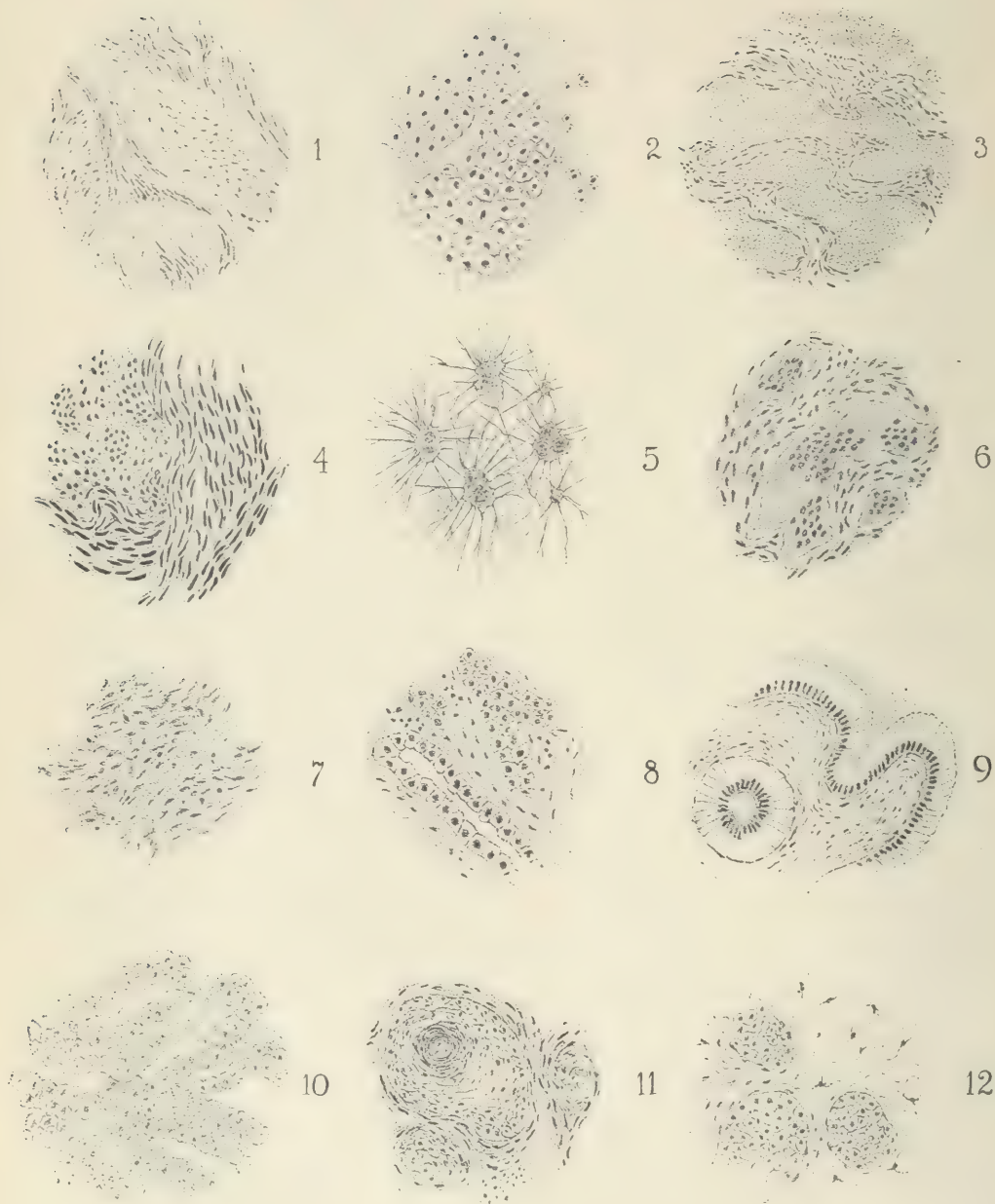
3. That by the use of appropriate means these bodies can be isolated and cultivated outside the body.

4. That these cultures, when introduced into certain animals, can cause death, with the production of tumors, so far of endothelial origin; and that pure cultures can be made from these tumors which, if inoculated into suitable animals, will produce again similar growths. H. G. Plimmer (Practitioner, Apr., '99).

We can only say that, for the development of a tumor, inherited and acquired characteristics of certain cells and groups of cells show a tendency to increased activity, with the formation of atypical tissue.

Classification of Tumors.—Tumors should be investigated in the same manner as the botanist studies plants: by groups, genera, species, and varieties. This method of procedure has been best elaborated by J. Bland Sutton, in his work on tumors, innocent and malignant, and the arrangement herein followed is based largely upon his classification as there given.

According to Sutton, tumors are con-



1. Fibroma. 2. Chondroma (after Ziegler). 3. Cavernous angioma of the liver. 4. Myoma. 5. Glioma of the brain. 6. Giant-celled sarcoma. 7. Spindle-celled sarcoma. 8. Endothelioma of the pia mater. 9. Adenoma. 10. Cancer. 11. Epithelioma with an epithelial pearl. 12. Myxomatous cancer.

veniently arranged into four main groups, each group containing several genera, each genus having one or more species, each species being divisible, in turn, into one or more varieties. The groups and genera are based on their microscopical and embryonal appearances,

while the species usually represent their situation in the body or some striking characteristic.

The groups are: I. Connective-tissue tumors. II. Epithelial tumors. III. Dermoids. IV. Cysts. Subgroup: pseudocysts.

I. CONNECTIVE-TISSUE TUMORS.

Genera.

1. Lipomata (fatty tumors). (The word lipoma is not to be confused with lipæmia, the latter word meaning fat in the blood.)
2. Chondromata (cartilaginous tumors).
3. Osteomata (osseous tumors).
4. Odontomata (tooth-tumors).
5. Fibromata (fibrous tumors).
6. Myxomata.
7. Gliomata (neuroglial tumors).
8. Sarcomata. These tumors are made up of embryonal connective tissue.
9. Myelomata, usually known as myeloid, or giant-celled, sarcoma. Red marrow as a tissue is as distinct as adipose, myxomatous, or fibrous tissue, and is entitled to be placed in a separate genus by itself. (Edinburgh Med. Jour., Feb., '97).
10. Psammoma endothelioma. Ziegler considers it probably advisable to class this among the epithelial tumors not-

Species.

1. Subcutaneous. 2. Subserous. 3. Subsynovial. 4. Submucous. 5. Intermuscular. 6. Intramuscular. 7. Periosteal. 8. Meningeal.
1. Chondromata. 2. Ecchondroses. 3. Loose cartilages in joints.
1. Osteophytes. 2. Enostoses. 3. Exostoses. 4. Periosteal exostoses. 5. Parosteal osteoma. 6. Disconnected osteoma. 7. Heteroplastic osteoma.
1. Epithelial odontome, from the enamel organ. 2. Follicular odontome. 3. Fibrous odontome. 4. Cementome. 5. Compound follicular odontome. (2, 3, 4, and 5 are from the tooth-follicle.) 6. Radicular odontome; from the papilla. 7. Composite odontome; from the whole germ.
1. Simple fibromata. 2. Molluscum fibrosum (include here keloid). 3. Neurofibromata.
1. Nasal and aural polypi. 2. Cutaneous myxomata. 3. Neuromyxomata.
- Found in brain, cord, and retina.
1. Round-celled sarcoma (small and large). 2. Lymphosarcoma. 3. Spindle-celled sarcoma (small and large). 4. Alveolar. 5. Melanotic.

The relative malignancy of the sarcomata is as follows: 1st. Lymphosarcoma; small, round-celled sarcomata; melanotic, spindle-celled myosarcoma; spindle-celled chondrosarcoma; myeloid sarcoma.

Genera.

withstanding the fact that the cells of the pericardium, pleura, blood-vessels, etc., arise from the mesoderm.

11. Myomata (muscle-tumors).

12. Neuromata (tumors on nerves).

13. Angiomata (tumors composed of blood-vessels).

14. Lymphangiomata (tumors of lymphatic vessels).

Species.

1. Leiomyomata (rhabdomyomata, considered by Sutton as a variety of the spindle-celled sarcoma). Met with in the uterus, broad ligament, ovary, ovarian ligament, round ligament of the uterus, vagina, œsophagus, stomach, intestine, scrotum, skin, bladder, and prostate.

1. Neurofibromata. 2. Plexiform neuromata. 3. Traumatic neuroma.

1. Simple nævus. 2. Cavernous nævus. 3. Plexiform angioma.

1. Lymphatic nævus. 2. Cavernous lymphangioma. 3. Lymphatic cyst.

II. EPITHELIAL TUMORS.

Genera.

1. Papillomata.

2. Cutaneous horns.

3. Epithelioma.

4. Adenoma.

5. Carcinoma (cancer).

Species.

1. Skin warts. 2. Villous papillomata. 3. Intracystic warts. 4. Psammomata.

1. Sebaceous horns. 2. Wart horns. 3. Cicatricial horns. 4. Nail horns.

Epithelioma.

1. Mammary. 2. Sebaceous. 3. Thyroid. 4. Pituitary. 5. Prostatic. 6. Parotid. 7. Hepatic. 8. Renal. 9. Ovarian. 10. Testicular. 11. Gastric. 12. Intestinal. 13. Fallopian. 14. Uterine.

1. Mammary. 2. Sebaceous. 3. Thyroid. 4. Prostatic. 5. Parotid. 6. Pancreatic. 7. Hepatic. 8. Renal. 9. Ovarian. 10. Testicular. 11. Gastric. 12. Intestinal. 13. Fallopian. 14. Uterine.

III. DERMIDS.

Genera.

1. Sequestration dermoids.

2. Tubulo-dermoids.

3. Ovarian dermoids.

4. Dermoid patches.

IV. CYSTS.

Genera.

1. Retention cysts.

2. Tubulo-cysts.

3. Hydroceles.

Species.

1. Hydrometra. 2. Hydrosalpinx. 3. Hydro-nephrosis. 4. Hydrocholecyst.

1. Vitello-intestinal. 2. Allantoic (urachal). 3. Paroöphoritic. 4. Parovarian. 5. Cysts of Gärtner's duct. 6. Cystic disease of testis. 7. Encysted hydrocele of testis. 8. Cysts of Müller's duct.

1. Of the tunica vaginalis. 2. Of the canal of Nück. 3. Of the ovary. 4. Of the neck.

Genera.

4. Gland-cysts.

There are conditions often classed as cysts which are arranged in a subgroup entitled

PSEUDO-CYSTS:—

1. Diverticula.

2. Bursæ.

3. Neural cysts.

4. Parasites.

I. Connective-Tissue Tumors.

Lipomata.—Lipomata most frequently grow in those situations where fat is normally present, exceptions being found, as in the brain and the submucous tissue of the intestine. They may be single or multiple, and frequently reach a large size, weighing at times as much as 100 pounds. Even in marked emaciation a fatty tumor does not show the atrophy which one would naturally expect. An hereditary tendency is sometimes noticed. Ulceration often takes place at a point opposite the entrance of the blood-vessels, and pyogenic micro-organisms may gain access to the body by this means. There is often a history of a blow or of irritation to account for the development of these tumors.

Macroscopically, lipomata are composed of adipose tissue, and appear as rounded, lobulated, capsulated masses. They may be pedunculated. Septa containing the blood-vessels run from the capsule, dividing the tumor into lobules. They frequently undergo myxomatous degeneration, and show calcareous infiltration. Unless irritation has occurred, lipomata are movable within their capsule. Care must be taken not to mistake this class of tumors for cysts, especially if they are situated upon the head. The sucking cushions of the cheek in emaciated children sometimes stand out prominently and may be mistaken for

Species.

1. Ranulæ. 2. Pancreatic cysts. 3. Chyle-cysts. 4. Dacryops.

1. Intestinal. 2. Vesical. 3. Pharyngeal. 4. Esophageal. 5. Tracheal. 6. Synovial. 7. Meningeal.

Bursa.

1. Hydrocephalus. 2. Hydrocele of fourth ventricle. 3. Meningocele (cranial). 4. Spina bifida.

Hydatids.

lipomata. Madelung ("Ueber den Fetthals," Langenbeck's Arch., vol. xxxvii, '88) has observed in males a rare nodular and infiltrating lipomatous condition in the neck (fatty neck).

On the palm of the hand, where they are usually congenital, they may simulate a ganglion. Lipoma of the palm or in other situations may be distinguished from a fluid collection by spraying ether over the part. In case of lipoma the fatty matter will become solidified by the cooling process. In a recent post-mortem the writer found that the surgeon had mistaken some small lipomatous masses in the inguinal canal for the omentum, and had reduced the sac of the hernia, believing it to be bowel. Persons have worn trusses for years, thinking that they had hernia, where the masses were only fat. The appendices epiploicæ when markedly enlarged may be considered to be lipomata. Microscopically the tissue looks like ordinary fatty tissue, but the full-formed cells are rather larger, and numerous smaller connective-tissue cells are found, containing, as yet, little or no fat. The cells are frequently polyhedral from pressure.

Chondromata.—Chondromata, or enchondromata, are tumors which are chiefly made up of cartilaginous tissue. Connective tissue usually covers their surface (perichondrium) and forms penetrating bands in which the blood-vessels

are to be found. They usually develop in those situations where cartilage is normally to be seen, but they also occur in those situations where one normally does not expect to find cartilage, as in the testicle and the parotid. Sutton (Practitioner, Nov., '97) states that chondromata are fifty times as frequent in the parotid gland as in the submaxillary. No case has been described in the pancreas. In bones they usually originate in the periosteum and the marrow, though they often spring from remnants of cartilaginous tissue which have not been converted into bone. In one of my cases the tumor grew from the pelvis, and reached the size of a foetal head, the cartilage being almost as pure as that seen in a joint. The blood-supply, however, was poor. These tumors often appear multiple upon the hands and feet. The variety of cartilage is usually hyaline. Microscopically some of the cells are capsulated, while others are oval, polyhedral, or spindle-shaped. They are very irregularly distributed, and assume different forms in the same tumor. Chondromata which develop from previously existing cartilaginous tissue are often spoken of as *ecchondroses*. The cells undergo fatty degeneration, myxomatous change, calcification, and ossification. Virchow has described, in the middle line of the clivus in the region of the spheno-occipital articulation, small tumors containing cartilage, which are either found under the dura or break their way through into the arachnoid and pia.

Osteomata.—Osteomata are composed of tissues more or less resembling bone in their microscopical structure. Intermediary forms are known as of the compact variety. When very dense, they are spoken of as *eburnated*; when loose in structure, as *spongy* or *medullary* osteomata. They are usually found in the

neighborhood of bone, but may occur as heteroplastic growths: *i.e.*, in those situations, as in the lung, where no bone is normally found. Osteophytes are spiculated processes usually attached to bones, but are also found elsewhere, as in the *falx cerebri*, where they are quite common and are due to an internal ossifying pachymeningitis. More extensive and more tumor-like roughened prolongations from bones are spoken of as *exostoses*; circumscribed patches within the bone are called *enostoses*; periosteal exostoses, when in the periosteum, but separated from the bone; are named *parosteal osteomata*, when near the bone and disconnected; *osteoma* when still farther away.

In the *eburnated* variety the growths may be single or multiple, and are found especially in the flat bones of the skull. The *lamellæ* follow the outline of the tumor, and contain no blood-vessels or Haversian canals, though narrow canaliculi are found. The compact osteoma may be found in the meninges of the brain, in the choroid of the eye, in the pericardium, etc. The vessels and Haversian canals run at right angles to the long axis of the bone. In the spongy form Haversian systems are seen, and the character of the growth is like that seen on the extremities of the long bones. They assume the greatest variety of forms, and combine as *osteofibroma*, *osteochondroma*, *osteochondrosarcoma*, and *osteosarcoma*. When combined with sarcomata, they may give metastasis, which sometimes even appear on the skin. The continuous exercise of a muscle, as by drilling with the gun, or in horseback-riding, may give rise to osseous formations in the muscle. *Myositis ossificans* is a peculiar progressive disturbance of the muscular connective tissue occurring in early youth.

Odontomata.—These tumors have been but little studied and are often classed among the osteomata or dermoids. They are made up of dental tissues in different amounts and in different degrees of development. Thus, there may be teeth-germs other than these normally to be developed, and these may undergo proliferative changes in any of their component parts. A tooth may grow upward into the antrum of Highmore and there develop into an odontoma. These tumors are rarely diagnosed before operation, and unnecessarily severe operations, as excising a portion of the mandible, are sometimes practiced where mere removal of the tooth or enucleation of the tumor is all that is required for their cure, as they are not malignant. Odontomata are found in early adult life. They also occur in the lower animals, as in the horse.

Fibromata.—Fibromata are composed of connective tissue; if rich in cells, they are spoken of as soft, and scrapings show spindle-formed cells; if made up largely of bundles of fibrils, they are called hard. They occur as nodular, capsulated tumors, sharply defined from the surrounding tissues, and are especially common in the colored race. They may assume the form of polyps or papillomata at the junction of epithelial and mucous surfaces, as in the vagina. On section the larger nodes are white and glistening, and are seen to be made up of smaller nodes arranged concentrically; cutting gives rise to a peculiar, creaking noise. Fibrous tissue is widely distributed throughout the body; hence, as would be expected *a priori*, these tumors occur in the most diverse situations. In the breast the pericanalicular variety is often found. They are frequently multiple, especially in the uterus and the skin, and stain well with picrocarmin. Areas of softening often

occur, due to fatty degeneration, myxomatous changes, etc. They sometimes show dilated blood-vessels and lymph-channels, and in the uterus are peculiarly liable to undergo calcareous infiltration. In the uterus they are often combined with myoma. Elephantiasis, though attended with much overgrowth of fibrous tissue, should not be classed here, as it is due to the mechanical obstruction of the lymph-channels.

Keloids.—These are peculiarly dense forms of fibromata, and most often follow wounds, sometimes so small as to have escaped notice. They are sometimes very troublesome on the face, neck, and breast of colored persons. They are also seen in the spleen. Extensive thickenings of the serous membranes, such as the pleura, are the remnants of old inflammatory lesions.

Myxomata.—These tumors are largely composed of mucoid tissue. The cells are branched and irregular, their prolongations interweaving the one with the other. On section the surface is more or less transparent and the blood-vessels can be seen beneath the surface. Myxomatous fluid coagulates upon the addition of water. These tumors are never composed entirely of myxomatous tissue, as they must have a frame-work upon which to be formed. The best-known varieties are fibromyxoma, lipomyxoma, chondromyxoma, and myxosarcoma. Fibrous, fatty, cartilaginous, and sarcomatous tissue may undergo myxomatous degeneration. Myxochondromata are especially common in the parotid.

Gliomata.—Glioma and ganglionic neuroglioma, though of epithelial origin, are classified among the connective-tissue tumors. In one of my cases at Elwyn, of a cerebral glioma, careful inspection revealed only a local swelling, flattening, increase in size of the convolutions, and

slight difference in color, and the tumor was distinguished from the healthy cerebral structures with the greatest difficulty. Microscopically gliomata are composed of neuroglia, the cells giving off delicate fibres, which interlace the one with the other, the cells, which assume a large variety of shapes, having one or more nuclei. If the amount of blood contained in the dilated blood-vessels is large, they have a reddish color and softer consistency. Ganglionic neurogliomata are made up of hypertrophic neuroglia, ganglionic cells, and nerve-fibres. They form striking pictures under the microscope, and must be looked upon as due to developmental errors occurring in extra-uterine life.

Sarcomata.—The cells in sarcomata resemble those seen in embryonal tissue, and greatly predominate, both in number and relatively in size, over the intercellular substance. They start either in those situations where we normally have connective tissue; in tumors of connective-tissue origin, such as fibroma, chondroma, etc.; in the uterine decidua, or in dermoids. Sarcomata are rare in the liver, intestinal tract, uterus, and lungs. Degenerative changes are common. We may recognize three groups: 1. Those composed of conglomerations of ordinary cells, not arranged in any special order or possessing any peculiar characteristics. 2. The cells are so arranged as to resemble cancerous tumors. 3. The cells, matrix, or vessels possess certain inherent characteristics which give rise to visible peculiarities. In the first group belong the small-celled and large-celled sarcomata, lymphosarcoma, small spindle-celled and large spindle-celled sarcomata, and polymorphous forms, such as the oat-seed-like variety of Hamilton. Giant-celled sarcomata are classed as a separate genus under mye-

lomata. The second group consists of the alveolar sarcoma, the tubular sarcoma, and the endotheliomata. The latter tumors are found in the coverings of the brain, pleura, periosteum, pericardium, breast, and skin. They combine at times with angiomas. In the third group we have pigmented cells, melanosarcoma, and chloroma. In psammoma there is a deposit of sand.

Lanz (Deut. med. Woch., No. 20, '99) has shown that the introduction of melanosarcomatous tissue into the spleen of a guinea-pig is attended in six weeks with the production of pigmented cells in the skin and various other organs of the animal experimented upon.

Myelomata.—Myelomata arise from the red marrow of cancellous bone, and are especially liable to occur in those situations and periods of life where it is present in the largest quantities. Owing to its great vascularity, its cut surface looks like fresh liver. Microscopically the giant cells predominate, though round and spindle cells may be present in considerable numbers. The tibia is the bone most frequently affected, usually in its upper position, while the radius is attacked but one-fifth as often. Of the bones of the head, the jaws alone are affected. The disease usually occurs before the 25th year, and metastasis is rare. The neoplasms sometimes weigh from 30 to 40 pounds, and, though rare, form such striking specimens that few museums are without a goodly number of them upon their shelves. Thorough enucleation or high amputation will often result in permanent cure.

Myomata.—Unstriped muscular fibres go to make up the tissue of a myoma, and the tumor is then called leiomyoma by those who designate tumors composed of striped muscular tissue as rhabdomyomata. These tumors are, however,

better classed among the sarcomata. They are widely distributed throughout the body, and are usually combined with fibrous tissue. In the uterus they may be situated beneath the peritoneum within the uterine wall, and beneath the mucous membrane, and are called, respectively, subserous, intramural, and submucous myomata. They occur also in the adnexa and ligaments around the uterus, in the intestinal tract, scrotum, skin, bladder, and prostate. Microscopically the fascicular bands of muscular tissue are cut at all angles, and give a most varied appearance to the field, resembling here a spindle-celled sarcoma and there the cells of a fibroma. They undergo mucoid degeneration, fatty metamorphosis, telangiectatic changes, calcification, septic infection, etc. Death may ensue through hæmorrhage, mechanical effects, pregnancy, or peritonitis. To the touch they feel like a pregnant uterus. A gynæcologist once sent me a specimen which he had removed at an operation, and said he waited until he was alone before venturing to see whether or not he had made an error of diagnosis. At the menopause they usually cease growing, and for this reason oöphorectomy is often practiced with benefit.

Neurofibroma, Plexiform Neuroma, and Amputation Neuroma.—Neurofibroma may develop as an overgrowth of the endoneurium, the perineurium, or even the epineurium.

Multiple neuromata of the skin are known as molluscum fibrosum. Over 2000 of these small tumors may exist along the course of the different nerves involved.

Plexiform neuroma shows tortuosity and increase in size of the nerve-bundles. The classical case of Bruns in his Bei-

träge z. klin. Chir., vol. viii, '91, occurred on the back of a youth aged 19 years.

Neuromata appear on the ends of nerves after injury, especially after amputations. They may reach the size of a cherry, and are often so painful as to demand resection or reamputation of the limb in which they occur. They are composed of connective tissue and outgrowths of the ends of the axis-cylinders.

Angiomata and Lymphangiomata.—Angiomata, popularly spoken of as strawberry patches, consist in a dilatation and the reproduction of new blood-vessels, the whole growing so as to give rise to a reddish and but slightly elevated tumor. Lymphangiomata show a similar dilatation of the lymphatics. They are most frequently congenital, though their growth takes place in later life. A careful examination of the face and neck will often reveal a slightly elevated reddish point, with three or four zigzag and overdilated capillaries. When in this stage they are easily destroyed. Later they undergo proliferative changes and extend in area. When once started, they may involve as much as half the face and neck and give rise to considerable disfigurement. They are composed of capillaries and veins, proliferation of the arteries not taking place.

Mibelli (Arch. f. Dermat., vol. xlv, p. 357) describes a condition which he calls angiokeratoma; it may be looked upon as a combination of a simple wart and a superficial angioma. The neoplasms are multiple, and occur almost always on the back of the hands and the feet.

Cavernous angiomata occur in the skin and the subcutaneous tissue, but more frequently in the liver, where the tissue resembles that of the cavernous body of the urethra. Hæmorrhoids are sometimes classed among the angiomata,

but they are mechanical in their formation, due to interference with the circulation, and can hardly be considered as tumors proper, though bunches are sometimes seen as large as a fist.

There is a peculiar form of racemose arterial angioma in which the arteries of a certain branch become dilated. To the finger these vessels feel like a mass of worms. When lymphangioma affects the tongue, the condition is known as macroglossia; when the cheek is diseased, it is called macrocheilia.

Many varieties of *nævi*, sun-spots, freckles, and moles often have as their basis a lymphangiomatous condition. Unna, Kromayer, Delbanco, and Scheuber (*Arch. f. Dermat.*, vol. xlv, p. 175) are of the opinion that the cell-nests in the cellular *nævi* come from the epithelial layers, while Ziegler and others consider that they originate in the connective tissue. One reason for this belief is the fact that they undergo sarcomatous and not cancerous changes.

II. Epithelial (Organoid) Tumors.

Papilloma.—The ordinary wart as it appears on the hand is a papillomatous growth composed of dense connective tissue containing blood-vessels and covered with epithelial cells. Lanz (*Deut. med. Woch.*, No. 20, '99) has experimentally proved the possibility of the transplantation of warts. They may be as large as the fist. Warts are found on mucous membranes, and when in the bladder they are spoken of as villous tumors. Small pieces of these tumors are sometimes passed in the urine. Hæmorrhage may be excessive. Intracystic villous papillomata occur in the breast and ovary.

Cutaneous Horns.—Cutaneous horns are objects of curiosity and popular dread among the common people, and are often seen in museums. They are due

to the escape of the contents of a sebaceous cyst, which becomes dried and is pushed further out by its collection of new material.

Epithelioma.—An epithelioma is a proliferation of stratified epithelium which has broken through the basement membrane, and in these situations shows the presence of epithelial nests. These tumors are peculiarly liable to occur in those places where one kind of epithelium joins another, as at the junction of the mucous membrane of the eye, mouth, or anus with the skin. The term epithelioma is often used as a synonym for cancer, but the latter tumors originate from glandular structures. Epitheliomata are often caused by irritation, as in the pipe-smoker's epithelioma of the lip and the now almost extinct variety of chimney-sweeper's epithelioma of the scrotum. They are malignant tumors, prone to recurrence, and give metastasis by the lymph-channels, though not to so great an extent as cancer. Their first appearance may be as a wart, fissure, or nodule. Fantastic shapes are often assumed, as on the penis, when they have attained considerable size.

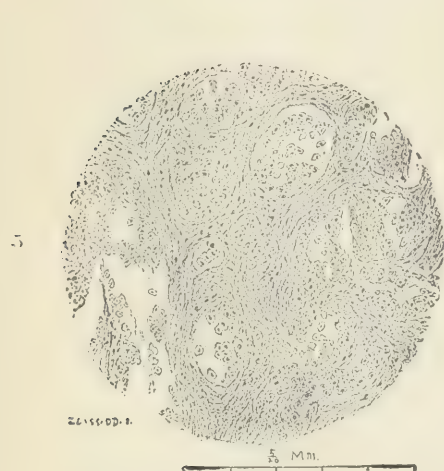
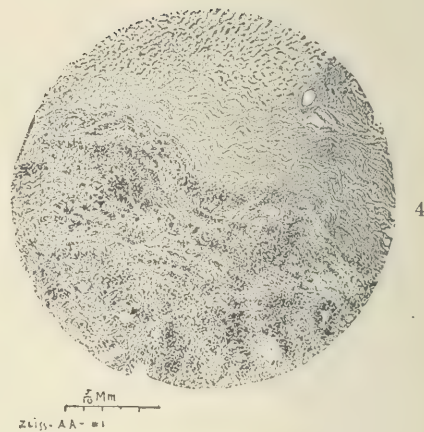
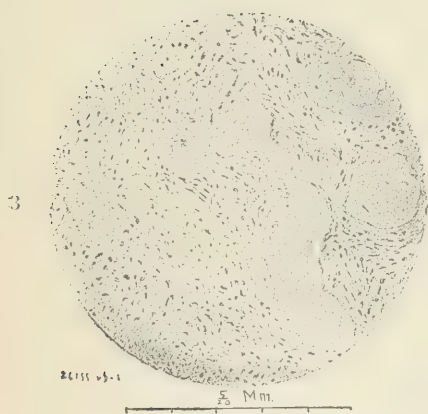
Adenoma.—An adenoma imitates, but does not fulfill, the function of the secreting gland in which it is found. The situations where adenomata are found are given in the classification of tumors.

Literature of '97-'98-'99.

Adenoma is the nearest approach to a malignant tumor which is consistent with a non-parasitic theory. It requires only the added impetus of a parasite to convert an innocent enlargement into an exceedingly malignant growth. Roswell Park (*Amer. Jour. Med. Sci.*, May, '98).

Carcinoma.—Cancers arise from a malignant proliferation of glandular tissue, the cause of which is at present unknown. They at first resemble adeno-





1, False neuroma. 2, Round-celled sarcoma of the heart. 3, Osteosarcoma of the jaw.
4, Melanotic sarcoma of the liver. 5, Alveolar sarcoma. 6, Cancer of the uterus.

mata in their growth, but gradually become less and less like the glands from which they originate, until irregular clumps of epithelial cells have broken through their lining membrane and are to be found collected in the acini and ducts.

In explaining to students the differences between a normal gland, adenoma, and cancers the following simile is often employed by pathologists: A gland may be likened to a dwelling-house complete in every detail, the acini being the room, the ducts the passage-way, the connective tissue the frame-work, and the epithelium the plaster upon the walls. Follow-

ing this simile, an adenoma may be regarded as an architecturally atypical house in which there has been a purposeless addition of rooms or halls, but in which each addition still shows, more or less clearly, the normal frame-work and plaster. In cancer the arrangement is as if the house had collapsed and the plaster (epithelial cells) had broken through the walls (connective tissue) into the rooms (acini) and halls (ducts), and then all of the constituents had grown in a conglomerate sort of a fashion, involving first the neighboring houses (tissues) and finally affecting those houses (other organs) at a distance (metastasis).

The contrast between sarcomata and carcinomata is shown in the following table of differences:—

Sarcomata.

1. Are of a connective-tissue type and are composed almost entirely of cells imbedded in an homogeneous or reticular matter. Rarely forms alveoli.
2. Cells endothelial, embryonal, or lymphoid.
3. Acetic acid and caustic potash almost dissolve them.
4. Blood-channels without muscular walls, running free between the cells. Small hæmorrhages common.
5. No fat within tumor proper. Often capsulated.
6. Metastasis by the blood-vessels.
7. May affect lymph-glands primarily, but not by metastasis.
8. Develop in connective-tissue substance. Deep-seated and grow upward.
9. Skin not adherent unless through associated inflammation.
10. Not usually painful.
11. Grow in young, well-nourished individuals chiefly.
12. Do not often give history of heredity.
13. Grow rapidly.
14. No micro-organism yet described.

Carcinomata.

1. Are of both a connective-tissue and epithelial type and are composed of cells lying free in the alveolar spaces formed by pre-existing connective tissue.
2. Cells exclusively epithelial. Distinct nuclei and nucleoli.
3. Acetic acid and caustic potash have no such effect.
4. True blood-vessels and also nerves running only through the connective-tissue frame-work.
5. Fat may be seen within the cancer-tissue. Rarely capsulated.
6. Metastasis by the lymphatics, though in later stages may spread with great rapidity by the blood-vessels.
7. Do not develop in lymph-glands primarily, but affect them by metastasis.
8. Develop from epithelium. Usually peripheral and grow downward.
9. Skin frequently adherent.
10. Painful.
11. Grow chiefly after middle life.
12. Often hereditary. Cancer-houses exist where occupant after occupant develops cancer.
13. Grow slowly.
14. Due to some organism, such as yeast, psorosperm, etc.

Sarcomata.

15. Juice absent or seen first some hours after removal.
16. Flesh-like, rounded, or bosselated, and regular masses. On section, smooth, pearly surface, often of a reddish tinge.
17. Infiltration of surrounding tissue when present is best seen with the microscope.
18. Pigmentation common. Osteosarcoma of bone reaches very large size.
19. Rarely interferes with the venous and lymphatic circulation.
20. Situation and order of frequency of the primary growths: corium, fasciæ, intermuscular septa, bone, periosteum, brain, ovary. Rare in liver, lung, uterus.
21. Myxomatous degeneration common.
22. Fat-cells apparently are converted at times into sarcomatous cells.
23. Cachexia rare and comes on later.
24. Diagnosis not aided by blood-count.
25. Sarcoma breaks down from extrinsic causes.

Oöphorectomy or an abdominal section at times may cause a malignant tumor to become inactive or even to decrease in size. Again, the prompt diagnosis of cancer of the body of the uterus is most important, as an early hysterectomy is attended with the most beneficial results, while the operation is almost hopeless after the disease has invaded the cervix. On the other hand, Gould (Trans. Clin. Soc., vol. xxx) reports a case of spontaneous disappearance of secondary cancerous growths in the female breast.

Snow (Lancet, Jan. 9, '97) believes that infection of the marrow of the bones occurs in nearly all cases of cancer of the breast, the humerus being the first bone

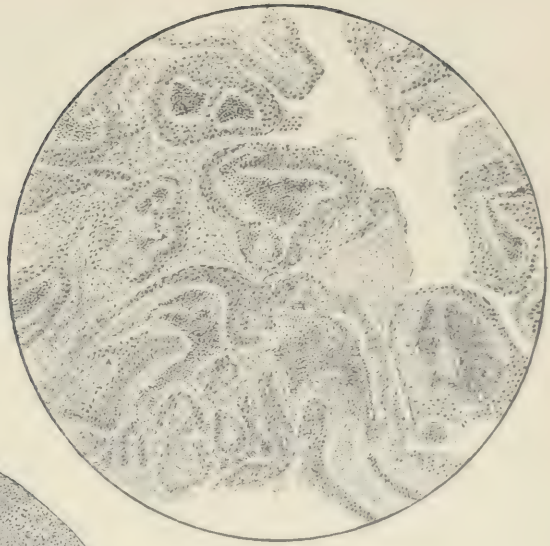
Carcinomata.

15. Juice can be expelled.
16. Nodular and irregular, often ulcerating surface, with fungoid borders and induration of the floor of the ulcer. On section, more granular; opaque; less reddish.
17. The malignancy of cancer is greater than that of sarcoma, the growth infiltrating into the surrounding tissue.
18. Pigmentation rare. Primary cancer of bone probably does not occur. Common in bone by metastasis and may render bone so brittle that it breaks with the application of the slightest force.
19. Often causes œdema and pressure outpouring of fluid.
20. Epithelial surfaces and glands—lips in male, vaginal portion of uterus, breast, stomach, intestine.
21. Colloid, mucoid, and cystic changes common.
22. Fat-cells are pushed aside or are used up in supplying nutriment to the invading cells.
23. Cachexia common, especially after metastasis has taken place.
24. Leucocytosis often increased.
25. Cancer shows intrinsic degenerations almost from the start.

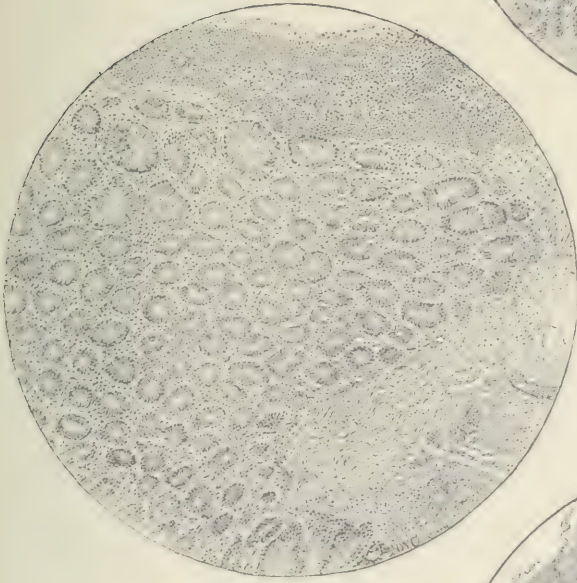
affected, as manifested, after the disease has existed eighteen months, by tenderness on pressure, and possibly slight thickening may be made out. The result is a firm, white marrow.

Babès and Stoicescu (Ann. de l'Inst. de Path. et de Bact. de Bucarest, vol. vi, p. 405) believe that it is possible to diagnose the presence of cancer of the internal organs by a microscopical study of the small cutaneous masses which sometimes appear by metastasis beneath the skin of the patients so affected.

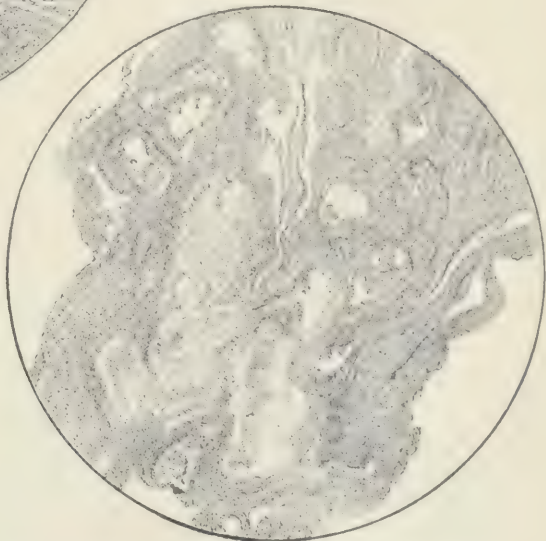
Keen, in his lectures, alludes to a case in which skin-grafting from the thigh was practiced upon the breast where a carcinoma had just been. A cancerous



1



2



3

1, Cancer of the uterus from scrapings obtained by means of a curette. 2, Adenocarcinoma of the rectum (Kraske operation). 3, Scraping from the uterus following an abortion.



nodule developed at the place from which the healthy skin was taken, no doubt from direct infection from the breast.

The frequency of cancer in the various parts of the body varies in different countries, and two observers in the same city often arrive at different conclusions. In my experience, cancers of the stomach and of the breast have been about equal in number, but were collected in entirely different ways, the first while making over 2000 autopsies and the latter being received by me for microscopical study. In 1266 cases of cancer (and epitheliomata) collected by Munn for the records of the Middlesex Hospital, 426 were of the uterus and 417 of the breast. In France cancer of the stomach seems to head the list in point of frequency.

Details of 722 cases of cancer under treatment or observation. Of these, 264 were men and 458 women. The average age of the men was 65, while that of the women was 45. As regards the part attacked, the breast was the most frequent (185 women, 2 men); next the uterus (149, of which 133 were of the cervix and 16 of the body); then the lip (125 men, 3 women); the stomach and pylorus (67 men, 14 women); the nose (28); the rectum (19 men, 9 women, 1 boy aged 14); the tongue (17 men, 3 women); the bladder (6 women, 2 men); the liver (3 men, 2 women); the œsophagus (3 men, 3 women); the clitoris (8); the vulva and vagina (5); the penis and prepuce (3); the intestine (10); the velum palati (6); the kidney (5 men, 3 women); Fallopian tube and ovary (3). A number of single cases of cancer of the parotid, finger, toe, testicle, axilla, etc., were reported. Recurrence was the more rapid the younger the patient. No relation could be traced between the patients' occupation and the disease. In 36 cases there had been phlegmon, whitlow, carbuncle, suppuration; in 12 erysipelas; in 11 scarlet fever; in 1 measles and scarlatina. A history of cancer among progenitors was obtained in 69 of the 722 cases (less than 10 per cent.).

Société Belge de Chir. (*La Presse Méd. Belge*, July 19, '96).

Study of the heredity of cancer based on 23 families, in which several members were affected. In these 23 families there were 69 cases of cancer, distributed as follows: 57 in the stomach, 4 in the uterus, 3 in the breast, 3 in the rectum, 1 in the bladder, 1 in the liver. Of the 57 cases occurring in the stomach, 41 were in males, 16 in females. In 11 families the heredity was exclusively in the male line, in 5 in the female; in 6 families both sexes were equally affected. Moreover, 14 out of 22 families showed cancer in the stomach, and of these the males were affected in 8. It appears, therefore, that heredity in cancer should be no longer doubtful. The special form of cancer is itself hereditary. Manichon (*Jour. de Méd.*, Sept. 10, '96).

Robert Behla (*Centralb. f. Bakt.*, Nov. 25, '99) has made some interesting studies in regard to the geographical distribution of cancer. (*See Plate 1.*) In seeking to learn the causes of cancer, attention must be directed to the influence of climate, soil, race, age, sex, occupation, heredity, alimentation, other diseases, etc. It is distributed by stagnant water or by floods, by the use of such water for domestic purposes, by eating of uncooked vegetables, such as salads and celery, by contact with infected animals, by the fungoid growths upon trees standing on the banks of streams due to taphrinoid and nectrioid chytridiaceæ, or by blood-sucking insects, etc.

Literature of '97-'98-'99.

In all cases of malignant disease there is a precancerous stage. Cancer is of local origin. Heredity as a factor in etiology is unimportant. In over 500 cases of cancer where careful investigations were made and the question of heredity was given the benefit of every possible doubt, less than 5 per cent. was found where it was claimed that there had been a history of cancer in the family. Daniel Lewis (*Med. Rev. of Rev.*, June 25, '98).

That cancer is not a disease of the poor and poorly nourished is shown as follows: 1. The improvement of the condition of the people in England has doubled in the last 150 years, poverty is one-half less; but, despite this, cancer has increased fourfold. 2. The mortality from cancer is least among the poor and greatest among the rich. 3. In Ireland, where people are as poor now as 50 years ago, cancer has not increased. Williams gives overnourishing and an easy life as predisposing causes. In rich West London the cancer mortality is twice that in the poor district of East London, while among savages it does not exist. Of 325 cases of cancer in females, none were in prostitutes; and of 160 cases only one patient had had syphilis. (Williams); 25,000 women out of 25,000,000 in Germany die of cancer uteri; of these only 10 to 30 per cent. are operable, and only one-third or one-fourth of the operable ones remain free from a return; hence only one-tenth of all cases of uterine cancer are saved from death by operation. Dührssen (*Deut. med. Woch.*, Jan. 26, '99).

Limestones are always associated in England and Wales with the lowest mortality from cancer, and flooded clays with the highest. Alfred Haviland (*Practitioner*, Apr., '99).

Cancer is rarely associated with tuberculosis in the same individual; this is, perhaps, partly due to the different ages at which these diseases occur. Tuberculosis is found everywhere; carcinoma is not found in certain areas, as in the polar regions. Cancer is undoubtedly on the increase in Great Britain, and in certain sections of America: *e.g.*, Buffalo, N. Y. Cancer is found at an earlier age than formerly, though this is possibly due, in some cases, to earlier diagnosis.

Literature of '97-'98-'99.

Attention called to the increasing mortality from carcinoma in recent years. The increasing prevalence of carcinoma in England and Wales since 1840 and the relative increase among males and

females is as follows: In 1840 carcinoma caused 2786 deaths, the proportion being 1 in 5646 of the total population and 1 in 129 of the total mortality, or 177 per million living. In 1896 the deaths due to the same disease numbered 23,521, or 1 in 1306 of the total population and 1 in 22 of the total mortality, or 764 per million living. No other disease can show anything like such an immense increase. It is believed that this increase may be in part due to the excessive consumption of meat of late years. Statistics show that more than double the amount of meat is consumed at present than there was fifty years ago. Insufficient exercise and deficient fresh vegetable food may also have an influence. The heavy mortality at advanced ages may be due to the survival in increased numbers of weakly lives artificially prolonged by improved conditions of existence. The increased frequency in males may be due to the increasing urban population, the men living under conditions resembling more closely those for women than heretofore. W. Roger Williams (*Lancet*, Aug. 20, '98).

Statistical data available do not justify the conclusion that an increase in cancer mortality has occurred within recent years. They rather tend to the conclusion that the increase in cancer is only apparent, and is due to improved diagnosis and more careful certification of the causes of death, especially to the latter. However, absolute proof is out of the question with such imperfect data. This conclusion only applies to the last forty years.

Cancer causes about 6 per cent. of the total deaths registered among males at ages over forty-five, and over 7 per cent. of the total deaths registered among females at ages over forty-five. Were the real facts known, it would be found that the number of deaths due to cancer is even greater than these figures indicate. Arthur Newsholme (*Practitioner*, Apr., '99).

Specimens. — When it is decided to have a tumor studied by a pathologist, the entire mass removed should be sent to him in as fresh a condition as pos-

sible, with as much of the history as will assist him in making a diagnosis. Too many surgeons show a disposition to conceal facts bearing upon the case, as if the pathologist were not to be trusted with them. The pathologist is an expert, and as such should be treated with the same consideration as any consultant. If the tumor cannot be forwarded in a fresh state, it should be placed in weak alcohol (from 40 to 50 per cent.) or weak formalin (from 1 to 2 per cent.) in a filled jar at least five times the size of the specimen.

On the occurrence of any turbidity of the fluid or reddening of the tissues, especially where they rest upon the bottom of the jar, the fluid should be immediately changed. When a portion of the tissue is saved for microscopical study alone, it is of the greatest importance that it should be taken from the margin of the tumor, and, when possible, should include a portion of the surrounding normal tissues. Such a piece need not exceed the size of the tip of the index finger, but its relations to the body and to the tumor should be very carefully noted.

One or two such pieces may be placed in a wide-mouthed four-ounce bottle, well stoppered, containing 95-per-cent. alcohol, 3-per-cent. formalin, saturated solution of bichloride of mercury, or Müller's solution. A very satisfactory solution is that composed of equal parts of a 3-per-cent.-formalin and 3-per-cent.-bichromate-of-potassium solution. The mixture should be made fresh when needed, and changed every day, when the pieces should be thoroughly washed in running water three or four hours and then placed in alcohol, 1 part, and water, 2 parts. If any discoloration occurs, the specimens are to be again washed and placed in the alcohol. This is to be re-

peated until the alcohol remains clear. If the specimen has become dried, it should be placed in water and when it resumes its normal size, alcohol should be gradually added until sufficient strength has been reached to preserve the tissue. Frozen sections from a tumor or uterine scrapings may be made with ether, carbon dioxide, or ethylchloride (see article by the writer in the *Internat. Med. Mag.*, Dec., '96), stained, and mounted, under the most favorable conditions, in ten minutes from the time of removal of the tumor or a portion of the tumor from the body. The advantages of this are evident. The pathologist can be present at an operation, and the microscopical findings will often be sufficient to decide, while the patient is still under the ether, whether a limb will have to be amputated, a hysterectomy performed, or the axillary glands thoroughly removed. Care must, of course, be taken that the decision be not a hasty one; but very often the surgeon must decide this very thing at the time of the operation, and considerable assistance may be afforded him by the opinion of a competent microscopist as to the immediate procedures to be taken.

III. Dermoids.

True dermoids are composed only of tissues found in the skin and mucous membrane. Sequestration dermoids, etc., are due to squeezing off of tissues where the lateral halves of the body coalesce. Implantation cysts are mechanically produced by the introduction of some tissue into a place where it does not belong and its further growth there. They are found especially in the fingers of persons who make their living by sewing. Tubulo-dermoids are etiologically associated with canals which were used in foetal life; thus, the thyro-lingual duct, the post-anal gut, and the branchial clefts

give rise at times to this variety of dermoids. Ovarian dermoids possess the greatest size and variety of contents, but when other tissues than those of the skin are found they must be regarded as more purely teratoid growths, which occur not only here, but elsewhere in the body. Thus, Woodhead's case ("Practical Path.," '92) of the ovary contained nerve-fibres, multipolar cells, ganglion cells, etc., and does not properly belong here.

IV. Cysts.

Cystomata are caused by the abnormal dilatation of ducts or cavities already formed. They may contain one of the products usually found—bile, saliva—or modified products. The last gives their situation, but, as they are hardly tumors in the true sense of the word, they are not described in this section.

Treatment.—The various methods of treatment have been reviewed in various parts of this work, and the reader is therefore referred to the INDEX.

For the treatment of malignant growths, however, the trend of modern thought but emphasizes the teachings of Gross, that the method of choice should be removal by surgical means as soon as possible, if this be practicable.

Coley's mixture of the toxins of erysipelas and bacillus prodigiosus is sometimes useful in inoperable sarcoma.

Conclusions in regard to the use of erysipelas toxins in malignant disease of the New York Surgical Society: 1. That the danger to the patient from this treatment is great. 2. Moreover, that the alleged successes are so few and doubtful in character that the most that can be fairly alleged for the treatment by toxins is that it may offer a very slight chance of amelioration. 3. That valuable time has often been lost in operable cases by postponing operation for the sake of giving the method of treatment a trial. 4. Finally, that if the

method is to be resorted to at all, it should be confined to absolutely inoperable cases. L. A. Stimson, A. G. Gerster, B. F. Curtis (Annals of Surg., July, '96).

Literature of '97-'98-'99.

Conclusions in regard to Coley's treatment of inoperable sarcomata:—

1. There is a considerable number of cases in which sarcomata that had been given up as hopeless often after repeated operations have absolutely and entirely disappeared under this method of treatment.

2. In some of these cases the patients have remained free from recurrence for upward of three years.

3. In several of the cases in which sarcomata have disappeared after an attack of erysipelas the patients have remained free from recurrence for seven years and upward.

4. The proportion of cases of sarcomata in which the patients are cured by the injection of the mixed toxins depends, among other things, upon the histological character of the growths. Spindle-celled sarcomata are the most hopeful.

5. The disappearance of sarcomata is not due to inflammation, but to an intensely rapid form of fatty degeneration.

6. Degeneration and absorption may occur whether the toxins are injected directly into the tumor or into some distant part of the body. In the former case the effect is more rapid and the constitutional symptoms are more severe.

7. The method is attended by a considerable degree of danger. It should, therefore, only be adopted in those cases for which there is no other remedy. The chief risk appears to be from collapse and pyæmia.

8. The toxins are of no use unless the cultures are taken from a virulent case of erysipelas or are made virulent by passing the streptococcus through rabbits.

9. The bacillus prodigiosus has the effect of immensely increasing the reaction.

10. The effect is most striking in the case of rapidly growing sarcomata.

11. Treatment should be continued

until the whole growth has vanished or has become so small that it can be removed.

12. If there is a recrudescence of the disease it does not follow that the toxins will be as efficacious the second time as they were the first.

13. Recurrence in other parts of the body may take place after many years. C. Mansell Moullin (*Lancet*, Feb. 5, '98).

Conclusions in regard to the treatment of malignant tumors with the mixed toxins of erysipelas and bacillus prodigiosus are as follow:—

1. The mixed toxins of erysipelas and bacillus prodigiosus have an inhibitory action upon the growth of malignant tumors of whatever variety.

2. This influence is far more marked in sarcoma than in carcinoma, and differs very markedly in the different varieties of sarcoma, being most pronounced in the spindle-celled variety, and least in the melanotic.

3. A considerable number of inoperable sarcomata, the correctness of the diagnosis of which is beyond question, have entirely disappeared under this method of treatment.

4. A large portion of these cases have remained free from recurrence more than three years after treatment.

5. The action of the toxins upon sarcoma must be regarded as a rapidly progressing necrobiosis, with fatty degeneration.

6. This method of treatment is attended with some risk unless certain precautions are taken. These risks are: (a) collapse from too large a dose, especially when injected into a very vascular tumor; (b) pyæmia from insufficient care as regards asepsis, especially in the presence of a granulating or sloughing surface. That these risks are slight is shown by the fact that, in upward of two hundred cases of malignant tumor treated personally, death occurred in but two as a result of the treatment.

7. The use of small doses of the toxins for a short time after primary operation as a prophylactic measure theoretically has much to recommend it.

8. The action of the toxins upon sarcoma, as shown by the clinical results,

is in strict accordance with the known action of the living streptococcus of erysipelas. Hence the method rests upon a perfectly logical and scientific basis.

9. The toxins, to be of value, must be prepared from highly-virulent cultures of the streptococcus of erysipelas. Coley (*Practitioner*, Apr., '99).

Any growing tumor of the breast should be removed, and any angiomatous spots (spider patches) should be watched, and, as soon as they start growing, should be gotten rid of, more for cosmetic reasons than for fear of harm to the functions of the organ.

HENRY W. CATTELL,
Philadelphia.

TUMORS OF THE BRAIN.

Symptoms.—The symptoms of a tumor of the brain vary according to the size of the growth, its location, the rapidity of its development, the age of the patient, the character of the tumor, and the indirect effects on distant portions of the brain. These may be classed as general and focal. Usually the former are the first to attract the attention of the patient, but occasionally the manifestations of the latter are the first to cause him to seek the advice of a physician. The general symptoms are usually headache, intermittent or constant, with periods of exacerbation, going on for weeks or months before dizziness, nausea, and apparently causeless vomiting are complained of; not infrequently disturbance in vision or a general convulsion occurs before or soon after the headache has become severe enough to interfere with the comfort of the patient. In the cases in which focal symptoms have been the first to appear, convulsive movements, limited to a group of muscles, to one limb, or to one side of the body, or symptoms of speech-disturbance lead the patient to seek relief.

As the disease advances the early symptoms become more marked, and numerous others are added, much to the discomfort and incapacity of the patient. Headache, if not severe before, soon becomes agonizing; vision gradually or rapidly lessens; vomiting often occurs with or without nausea, especially in early morning, when the lesion is situated in the posterior fossa or at the base of the brain, and the patient may become greatly emaciated; sustained mental effort is impossible, both on account of the headache which it usually augments and on account of the mental deterioration resulting from brain-disturbance; walking may become difficult or impossible, either from paralysis or from interference with muscular co-ordination, the latter usually being due to a growth in the posterior cerebral fossa, the cerebellum, or in the region of the corpora quadrigemina; there may be disturbances of special and general sensory phenomena. Various respiratory and circulatory irregularities may be present. Usually the patient becomes stuporous and finally comatose before death takes place. In a few cases convulsions cause death before the patient dies from exhaustion.

Among the general symptoms, headache, double optic neuritis (choked disk), vomiting, vertigo, and general convulsions are the most important.

HEADACHE is often the earliest symptom, and is usually one of the most prominent, constant, and distressing. It is present in from 75 to 95 per cent. My own experience leads me to believe that it is rarely absent throughout the course of the disease. It is less constant and less severe in certain gliomatous growths. It often intermits, and may be absent for prolonged periods, especially while the patient is taking large

doses of potassium iodide, although the tumor may not be syphilitic in character. The headache is often agonizing, especially during the periods of its exacerbation. In some cases the pain is so great, especially in subtentorial tumors, as to cause death in a few weeks, or, at most, in a few months, from the time that the headache becomes prominent. It is usually worse at night. In many cases, while the pain is sufficient to interfere with sleep and mental exertion, it is much less intense than in the severer ones. In not a few the pain amounts to little more than an uncomfortable cephalic fullness or tightness, with an occasional exacerbation. The pain may be lancinating, rending, stabbing, dull, heavy, or boring in character. It is usually most severe when the tumor is rapidly growing, when situated at the base below the tentorium so as to exert pressure on the veins of Galen, or in the cortex; least severe in slowly-growing tumors, especially when situated in the centrum ovale. The pain may be increased by anything that augments the blood-supply to the brain. It may be diffused or limited to one or more regions of the brain. Its location is no positive indication of the seat of the tumor, except in those cases in which the growth is superficial and involves the membranes, when the pain, and tenderness on percussion, may correspond to the seat of the morbid process. Tumors in the frontal region less frequently give rise to occipital pain than a growth in the posterior portion of the brain causes frontal headache. A persistent occipital or suboccipital pain usually points to a subtentorial growth, and, in these cases, pain often radiates down the posterior cervical region. A tumor in one cerebral hemisphere may give rise to pain in the opposite side of the head

and nowhere else; but a unilateral occipital headache usually corresponds to the side of the head on which the growth is situated.

CHOKED DISK, OPTIC NEURITIS, AND OPTIC-NERVE ATROPHY.—Choked disk, or optic neuritis, while not usually an early symptom, occurs in over 80 per cent. of the cases of tumor of the brain. It begins acutely, and only a few days or weeks may elapse from its first appearance until it has reached a degree of considerable intensity. An ophthalmoscopic examination may reveal it while vision is still well preserved. It is usually bilateral, but the morbid process is further advanced in one eye than in the other. When it is unilateral the indications are that the disease is anterior to the optic chiasm. Knies states that "simple neuritis, terminating in atrophy, is found less often than choked disk in cerebral tumors." According to this writer, it happens in tumors of the frontal lobe in which the tumor is close to the optic nerve. In all such cases the disk is choked to a greater or less extent, and when the stage of atrophy has set in the sinuosity of the vessels near the disk will be the only means by which to determine the secondary nature of the atrophied nerve. Primary atrophy of the optic nerve probably does not occur as a result of tumor of the brain.

Choked disk seems to occur less frequently in tumors of the medulla, and of the centrum ovale of the middle and anterior portions of the brain; most frequently when the growth is situated in the cerebellum, the corpus callosum, the corpora quadrigemina, and the great ganglia, or at the base of the brain.

VOMITING, a frequent symptom of tumor of the brain, occurs most commonly when the growth is large and rapidly growing, situated in the cerebellum

near the middle lobe or in the neighborhood of the corpora quadrigemina. It is a prominent symptom in about one-half the cases, often associated with severe headache, and may be projectile in character, and not associated with taking food or with nausea. When the growth is so situated as to affect the middle lobe of the cerebellum or corpora quadrigemina, vomiting may be produced by any sudden movement of the patient's head. Vertigo in many cases is unassociated with vomiting, but it may be a very annoying symptom, and almost constant, yet unattended by vomiting. Like the latter, it is most frequent in tumors of the cerebellum and adjacent parts. A general convulsion may precede other symptoms or it may occur at any stage of the disease. It is found in about one-third of the cases, and denotes active progress of the disease. General convulsions rapidly following each other late in the disease may prove fatal. Mental disturbance, insomnia, somnolence, and syncope are found in many cases.

FOCAL SYMPTOMS may be direct and result from the invasion of a portion of the brain by the growth, or indirect and due to its interfering with the function of structures more or less distant from the tumor. Both sets of symptoms are frequently present and prominent at the same time, requiring great care to separate the one from the other.

Incomplete hemiplegia, monoplegia, limited convulsive movements (Jacksonian epilepsy), paralysis or spasm of single muscles or groups of muscles, and contraction are the local disturbances in motility that may result from tumor of the brain. There may be, also, various perversions of the sensory phenomena, hemianopsia and aphasia, depending upon the seat of the growth.

The **COURSE** and **DURATION** of intra-

cranial growths are variable, depending upon the character of the tumor, its location, and the complications. The symptoms are usually gradual in their development, in a few rapid, and in others they are arrested for several months. Some tubercular growths may apparently run their course in a few weeks on account of the presence of meningitis, while others extend over a period of years. In a few cases, after a growth has gradually progressed several months or a year without any very alarming symptoms, death may suddenly occur with symptoms of a vascular lesion. The average duration of tumor of the brain is about fifteen months, but the variation is from a few months to two or three years, or even a greater length of time.

Diagnosis.—The first problem for the diagnostician to solve in a case is: Are the symptoms due to organic intracranial disease? When an organic lesion develops in a nervous subject, symptoms, functional in character, will be added to those of organic disease. Hysteria and organic disease are not infrequently found in the same subject at the same time. A multiplicity of symptoms pointing to hysteria is of less importance in enabling one to make a diagnosis than the presence of one symptom organic in origin. As a rule, symptoms that are usually regarded as organic when caused by functional disturbance are temporary and fleeting in character, and the opposite, while true in the vast majority of cases, finds a notable exception in multiple sclerosis of the central nervous system. Marked muscular wasting in the distal portion of a paralyzed limb of cerebral origin, associated with flexor contracture and decided increase of the deep reflexes over those of the corresponding limb of the opposite side; most cases of crossed paralysis or pronounced

trophic disturbance in one or both eyes, of cerebral origin; more than transient lateral homonymous hemianopsia or sensory aphasia, may be regarded, in the vast majority of cases, of organic origin, although only one of these conditions exists. There are other and more frequent symptoms which are always very strong evidence of organic brain disease, but not positive proof of it. Among these the first in importance is optic neuritis, or choked disk. The latter may be due to tumor, renal disease, lead encephalopathy, or pronounced anæmia. The first condition named produces much more swelling of the disks than is found resulting from any of the last three; besides, in the latter, there are evidences of either renal disease, lead poisoning, or anæmia. Intraventricular effusion or abscess of the brain may cause choked disk, but these diseases have their distinct symptoms. It must be borne in mind that organic brain disease may be present in a person suffering from disease of the kidneys, lead poisoning, or anæmia. Under such circumstances a careful analysis of the symptoms and a study of the case will enable the physician to determine the nature of the case. Persistent headache, obstinate vomiting, and vertigo are frequent symptoms of intracranial growths, but they rarely continue long unassociated with eye-changes, except possibly in tumors of the medulla. Paralysis or spasm of the ocular muscles, rapid in its development, and facial paralysis, not extracranial in origin, are usually due to organic brain disease. In hemiplegia of organic origin the deep reflexes of the paralyzed side are greatly in excess of those on the non-affected side. This is not so in hysteria. Hemianæsthesia, including the special senses, as observed by Gowers, "is one of the rarest effects

of cerebral tumors, and is absolutely unknown from this cause unless associated with loss of motor power." Whether it occurs from tumor or other forms of organic brain disease, affecting the posterior portion of the internal capsule, the lateral hemianopsia homonymous in character, will differ from the "crossed amblyopia" sometimes seen in hysteria. Persistent sensory aphasia is probably almost always due to an organic brain-lesion. Convulsions, general or local, must be seen and carefully observed by an intelligent nurse before the true nature can be determined by the physician. It is well to bear in mind that a febrile condition, simulating—by its periodicity—malaria, may occur in the course of organic disease of the brain, especially in connection with abscess, tumor attended by rapid softening of the surrounding substance, tuberculosis, and possibly syphilis.

Having satisfied ourselves that organic disease of the brain is present, the next question to determine is: Is it tumor? It is rare that tubercular meningitis is likely to be mistaken for tumor, except possibly in those cases which run a prolonged course. These are often attended with tubercular nodules or even a tubercular growth of considerable size. Under such circumstances the symptoms will partake of the character of meningitis and intracranial tumor, those of the latter predominating when the growth is large, and those of the former when the deposits are small. In those cases in which a tumor has existed prior to the development of meningitis, not infrequently a history of attacks of apparently-causeless vomiting, attended with severe headache, may be obtained. Aneurism is diagnosed by detecting a bruit. The principal symptoms of chronic cerebritis are headache, vomit-

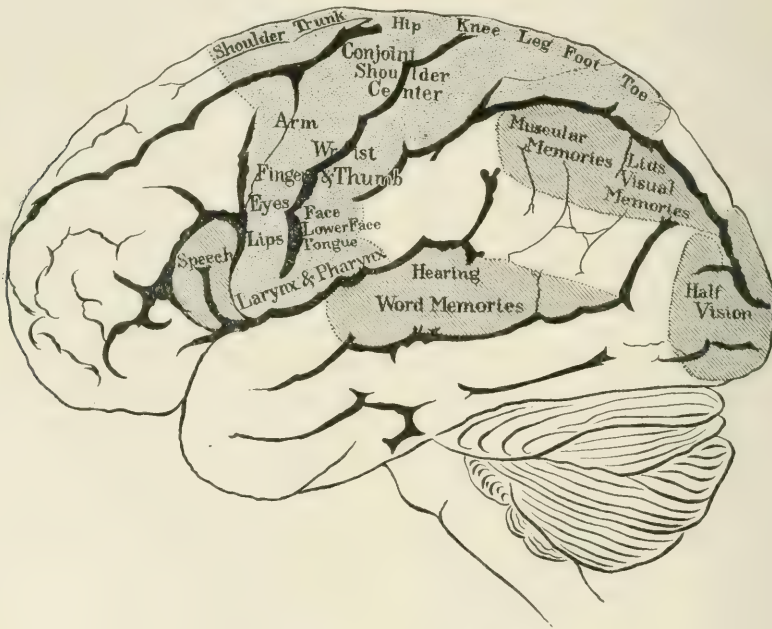
ing, and distinct optic neuritis, without localizing symptoms. This condition probably cannot be distinguished from tumor of the brain unattended by focal symptoms and pronounced choking of the disks. Chronic hydrocephalus with effusion into both lateral ventricles need not be mistaken for tumor if the symptoms of each are borne in mind and the history of the case is carefully studied. Distension of one lateral ventricle with pronounced unilateral choked disk was mistaken by me for tumor in a case in which the history was unobtainable. A syphilitic meningitis or a nodular tubercular condition of the meninges attended with great thickening of the membranes to such an extent as to give rise to distinct focal symptoms is clinically indistinguishable from an intracranial tumor. Alcoholic meningitis usually affects the convexity, and tremor is present. One needs only to be familiar with the delusions of grandeur, the character of the mental failure, and other symptoms common to parietic dementia to prevent his confounding it with tumor of the brain. The same may be said of the other forms of insanity, especially mania. In multiple sclerosis the tremor is bilateral; in tumor with tremor the latter is usually unilateral. The atypical symptoms of hysteria and parietic dementia often found in diffuse sclerosis of the cerebrum will aid in preventing this disease from being mistaken for tumor. In diffuse sclerosis if the cerebellum is affected and there is staggering gait, with a tendency to fall to one side, the absence of severe headache, optic neuritis, and vomiting will be against tumor and in favor of diffuse sclerosis. Chronic abscess of the brain does not cause total blindness or very marked choking of the optic disks.

What is the seat of the tumor? If

the tumor is in the premotor region of the frontal lobe, there may be few positive focal symptoms. Headache is rarely so agonizing, vomiting so constant, or choked disk so frequent as in tumors in the posterior portion of the brain. My experience has been that choked disk is absent in about one-half the cases of tumor of the premotor region of the frontal lobes. The mental symptoms are the most constant, but these are variable.

Amnesia is rarely complete unless the tumor is very large or both lobes are involved. If the tumor extends backward motor symptoms become manifest, and disturbances of speech are added in lesions of the left side in right-handed persons. Ataxia of the cerebellar type has been observed by a few in tumors of the frontal lobe.

TUMORS IN THE ROLANDIC, OR SO-CALLED MOTOR, REGION usually give rise



Brain, left hemisphere. (Dana.)

The patients may be apathetic, disregard the ordinary proprieties of life, and become filthy and partially demented as the disease progresses. Some exhibit a childishness foreign to their nature, and talk much of trivial things, especially when these relate to themselves; others are irritable, impatient, and at times may show a maniacal tendency; while nearly all manifest a lessened power of sustained attention and mental concentration, with absent-mindedness and lack of judgment.

to definite localizing symptoms. In the irritative stage of tumors of the cortex, these are Jacksonian epilepsy, involving the muscles of the face, arm, or leg, according to the seat of the growth, and sensory disturbance, often in the form of auræ and numb or tingling sensations, limited to the regions involved in the convulsive movements. After the lesion becomes destructive in character, weakness or paralysis of the affected muscles takes place. As a rule, after every Jacksonian

convulsion, the muscles involved in this are weak or paralyzed for a short time. The muscles first affected in the convulsion are the last to cease jerking, are the weakest, and denote the seat of the irritation in the brain. It is important to study the initial phenomena and the order in which one group of muscles after another is involved by the convulsion, as these afford aid in localizing the primary seat of the brain-lesion, especially early in the history of the disease. In some cases, probably those in which the irritation is limited to the cortex, the seizure may, for a time, consist of pain, numb or tingling sensations, limited to the distal portion of an extremity, or these may immediately precede a convulsive movement, which always begins in the part in which the sensory disturbance is first felt. When the convulsion begins in, or decidedly affects, the muscles of the lower face of either side, but most pronounced when the right is involved, temporary motor aphasia often follows the attack. Some subjective sensory loss, in the distal portion of the limb, is common in tumors of the motor cortex. According to Dana, the sense of localization is most affected.

TUMORS OF THE PARIETAL REGION may or may not give rise to localizing symptoms, depending upon their size and the involvement of certain structures. It is thought by some that muscular sense is affected by a lesion in the supramarginal convolution. On the left side, in right-handed persons, or on the right side in left-handed ones, a growth affecting the angular gyrus or inferior parietal lobule produces word-blindness. If the optic radiations are encroached upon by the tumor, lateral homonymous hemianopsia will be present.

TUMORS OF THE OCCIPITAL LOBE affecting the cuneus or optic radiations will

cause lateral homonymous hemianopsia, the blind fields being on the side opposite to that of the lesion. Mind-blindness has been observed in connection with growths in the left occipital lobe, especially near its anterior portion.

TUMORS OF THE TEMPORO-SPHENOIDAL LOBE may give rise to no focal symptoms, when they are situated on the right side. On the left side word-deafness will result if the posterior portions of the first and second convolutions are affected. When the anterior portion of the lobe is involved near the base on either side, disturbances in smell and taste may be present.

TUMORS OF THE CORPUS CALLOSUM may cause general symptoms of intracranial pressure, and, later, hemiparesis, or bilateral weakness, with rigidity of the muscles of the trunk and legs, and often ataxia of the cerebellar type. The disturbances are usually more marked on one side than on the other, and the legs are affected to a greater degree than the arms. Tumors of this region with ataxia are distinguished from those of the corpora quadrigemina by the absence of oculomotor symptoms until late in the disease, and from growths in the cerebellum from the cranial nerves of the bulb escaping.

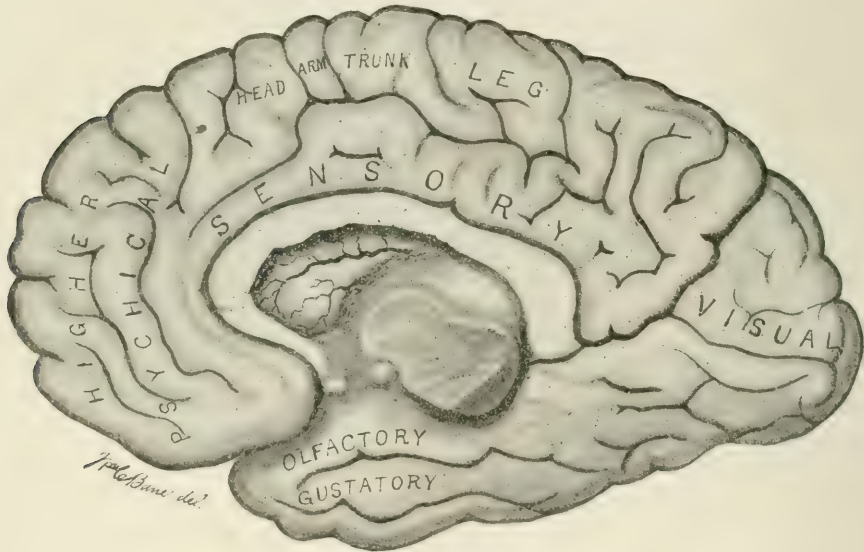
TUMORS OF THE GREAT GANGLIA give rise to no focal symptoms until the internal capsule is affected either directly or indirectly. Complete hemianæsthesia from tumor in the basal ganglia practically does not occur without motor defect. When the hemianæsthesia is complete, all the special senses may be lessened or lost on the anæsthetic side, the visual defect being lateral homonymous hemianopsia, with the blind fields on the side corresponding to the affected side of the body. Athetoid movements and marked inco-ordination, chiefly affecting

the hand, have been observed in lesions of the thalamus. A tremor similar in character to that of multiple sclerosis has occurred from tumor in this region, but it is always unilateral.

TUMORS OF THE CORPORA QUADRIGEMINA, besides the general symptoms, such as headache, double choked disk, and vomiting, cause ataxia and incomplete ophthalmoplegia. The ataxia is similar to that observed in lesions of the middle lobe of the cerebellum. Bruns states that the ophthalmoplegia will precede

the optic tract is seriously affected, lateral homonymous hemianopsia will be present, and the pupils will not react to light thrown into the eyes from the side of the blind fields: the hemiopic pupillary reflex of Wernicke.

TUMORS OF THE PONS give rise to distinct, but variable, symptoms, depending upon the size and exact location of the growth. A tumor may be situated to one side of the pons and cause decided pontile symptoms from direct pressure, and if the pons is pushed to one side,



Median aspect of the right hemiserebrum, showing cortical centres.

the ataxia when the lesion is in the corpora quadrigemina, but the ataxia will precede the former when the tumor is in the cerebellum.

TUMORS OF THE CRUS produce "crossed paralysis," hemiplegia on the opposite side of the body,—including the limbs and lower side of the face,—and paralysis of the third nerve on the side on which the tumor is located. Hemianæsthesia will be present on the hemiplegic side if the fibres on the upper or posterior portion of the crus are involved. If

against the bony structure, as not infrequently happens, the indirect-pressure symptoms on the opposite side of the pons from the seat of the tumor may be very pronounced. If the tumor is situated in the upper portion of the pons, on one side there will be "crossed paralysis," and possibly hemianæsthesia, as in tumor of the crus. During the irritative stage of the sixth nerve, the eyes may be spasmodically jerked toward the side of the lesion, but when this nerve is paralyzed conjugate deviation of the eyes will

be to the opposite side. The symptoms from a tumor in the upper portion of the pons on one side, if from diffusion of irritation the sensory tract on the opposite side is not affected, would be conjugate deviation of the eyes to the opposite side, weakness or paralysis, and disturbances of sensation throughout the entire opposite side of body, head, and face. Owing, however, to the diffuse character of the symptoms, both direct and indirect from tumor of the upper portion of the pons, the symptoms are more likely to be dilatation of the pupils, ptosis; strabismus, at times; sometimes cloudiness and ulceration of the cornea; pain, with hyperæsthesia and anæsthesia in the region of the distribution of the fifth nerve on side corresponding to that of the tumor; and hemiplegia and hemianæsthesia of the opposite side of the body and face, the latter if the lesion extends deep in the substance of the pons, often in the form of dissociation of sensory symptoms (loss of pain and temperature sensations; tactile preserved) and loss of conjugate movement of the eyes toward the side of the lesion. Other cranial nerves would probably be affected as the disease progressed. A tumor situated in the lower half of the pons on one side would give rise to crossed motor and sensory paralysis; the face, both the lower and upper on the side of the lesion; the body and limbs on the opposite side. Marked trophic disturbances usually occur through the distribution of the affected fifth cranial nerve. Articulation, deglutition, and respiration become affected in lesions of the extreme lower portion of the pons from the involvement of other cranial nerves. As a rule, these are late symptoms in the course of the disease. Tumors lying between the pons and dura often cause bilateral symptoms on account of the cord being pushed

against the bony structure. They differ from those caused by tumors within the pons in being more irritative and less destructive in character until late in the course of these growths, and cranial-nerve symptoms precede those of the pons.

Glycosuria and albuminuria may occur, giddiness is often intense, and vomiting troublesome if the middle peduncle of the pons is involved. The tumor may directly affect both sides of the pons and produce bilateral symptoms. The knee-jerks are as frequently absent as present, and are extremely variable: present and exaggerated at one time, normal or absent at another.

TUMORS OF THE MEDULLA at first may give rise to unilateral symptoms, but these soon become bilateral, and are somewhat similar to those of progressive bulbar paralysis, except that sensory as well as motor fibres are affected in the former. It must not be forgotten that an intradural tumor of the medulla gives rise to bilateral symptoms on account of the displacement of the medulla to one side against the foramen magnum.

TUMORS OF THE CEREBELLUM cause well-marked general symptoms, such as headache, double choked disks, vomiting, and often dizziness. Focal symptoms, however, will be entirely wanting if the tumor is not very large and situated in one hemisphere, especially in its posterior portion, so as not to affect the functions of the middle lobe or those of the pons. The most reliable and constant symptoms of a growth affecting the middle lobe are the disturbed muscular movements, the cranial-nerve symptoms, and the subjective sensations of insecurity, both while standing and lying. The inco-ordination of muscular movements is most pronounced in the legs, next in the trunk, and least in the arms.

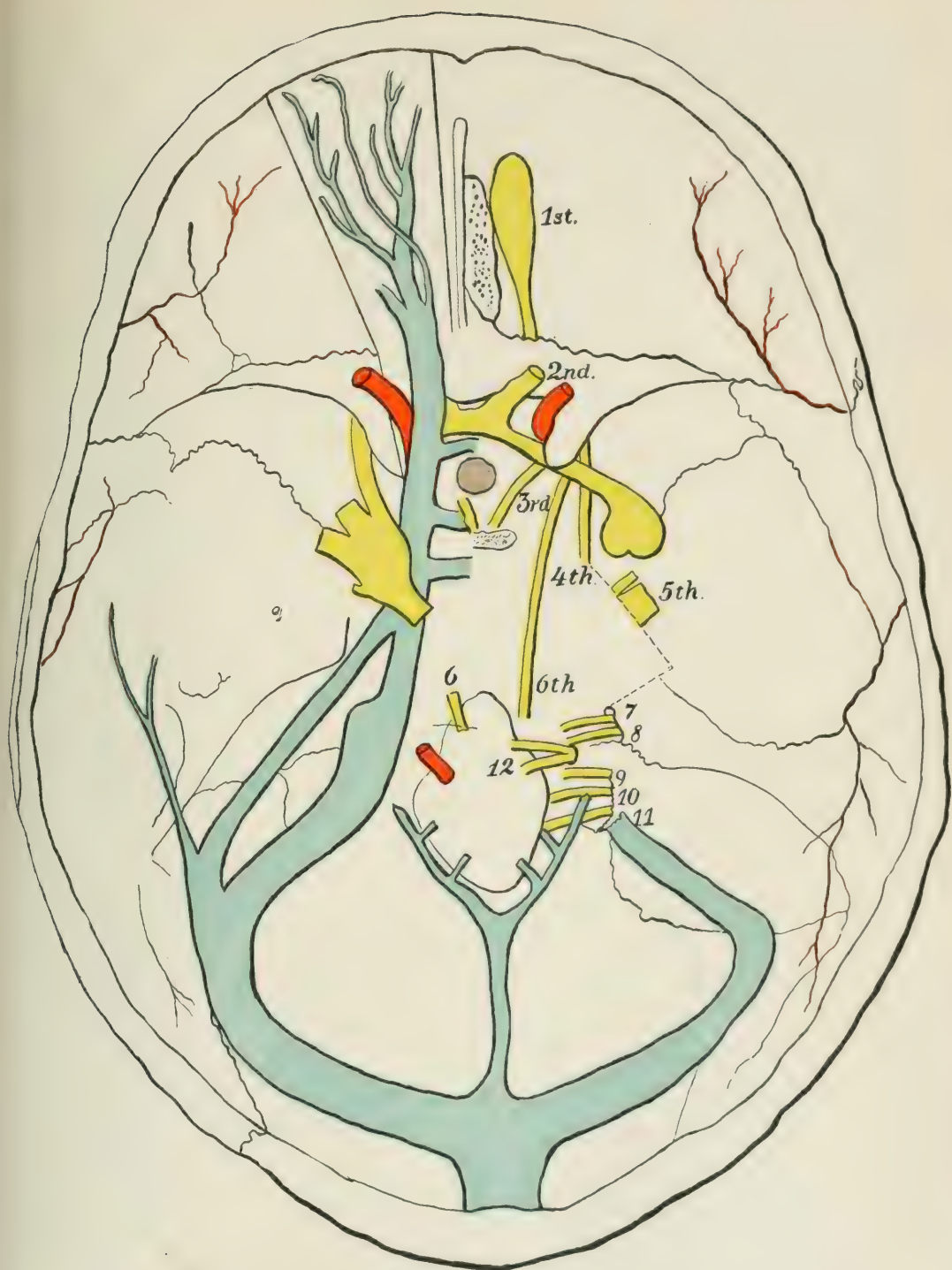
The patient's gait is similar to that of a drunken person, the feet well separated laterally in standing and walking, and the body is often thrown to one side, forward, or backward by forced muscular movements. There is no paralysis of legs or arms, unless the fibres in the pyramidal tracts are affected, and no anæsthesia. The patient has a sense of insecurity of his position, especially while standing, and this is sometimes complained of when he is lying in bed. If the tumor is situated well forward and in the median portion of the middle lobe, the cranial-nerve symptoms will be bilateral; if to one side they will either be unilateral or, at least, most marked on the side corresponding to the tumor. The facial, auditory, and sixth nerves are most commonly affected. The ophthalmoplegic symptoms observed in tumors of the cerebellum affecting the superior peduncles appear secondary to the inco-ordination; when they are due to a tumor in the corpora quadrigemina they precede the ataxia.

TUMORS OF THE BASE strictly limited to the anterior fossa would affect the olfactory nerves, but by extending backward into the middle fossa they may cause unilateral loss of sight or some form of hemianopsia. Mental symptoms are usually present on account of pressure on the anterior lobes. A tumor in the middle fossa, if situated near the sphenoidal fissure, may paralyze all the motor nerves to one eye and compress the first division of the fifth, causing unilateral ophthalmoplegia, anæsthesia, and pain in the region of distribution of this division of the trigeminal nerve, together with trophic changes in the eye. The Gasserian ganglion and all the divisions of the fifth nerve—as well the second, third, fourth, and sixth nerves—are exposed to the invasion of tumors in the

middle fossa. Tumors of the posterior fossa injure the cranial nerves, pons, and medulla, and give rise to many of the symptoms of tumor of the pons and medulla, with these differences: that tumors in this fossa affect the nerves before they do the pons or medulla; in paralysis of the sixth nerve from injury to its trunk the conjugate fibres of the internal rectus of the other eye are not affected, as in nuclear paralysis of this nerve; and the seventh and eighth nerves are usually involved by the same lesion, as they all lie near together at the base.

Multiple Tumors.—According to Dana, about one-seventh of all brain-tumors are multiple. The tubercular, cancerous, and melanotic varieties are most commonly multiple. I have found seven tubercular nodules of considerable size in one brain, situated in widely different portions of the brain.

In only a comparatively small number of cases is it possible to determine the exact nature of the growth, and often the conclusion at which one arrives is little more than a shrewd guess. Secondary growths in the brain usually are of the same nature as the primary one in other portions of the body. Evidences of syphilis or tuberculosis in a person suffering from tumor of the brain points to the probable nature of the growth. Inherited syphilis very rarely gives rise to tumor of the brain. The most common cerebral growths in children are the tubercular, and these may occur in childhood without the signs of tuberculosis in other portions of the body. The cerebellum, comparatively speaking, is remarkably exempt from syphilitic tumors, but the tubercular and the gliomatous are the most frequent here. Growths in the cortex are usually syphilitic, tubercular, or sarcomatous. Gliomata and sarcomata frequently occur in the cen-



Base of skull, showing the different fosse, with nerves and sinuses.

trum ovale, and may subsequently involve the cortex. The symptoms of most growths of the brain are at first favorably modified by active antisyphilitic treatment. If the improvement is very great and can be maintained by such treatment, it is strong evidence in favor of the syphilitic nature of the growth.

Etiology.—**PREDISPOSING CAUSES.**—Cerebral growths may occur at any time of life. The third decade furnishes the largest number, about 20 per cent.; the first and fourth about 18.5 per cent. each; and the second and fifth about 14 per cent. each. They are rare in extreme old age. Steffen has reported a case of tumor of the brain in an infant four weeks old.

The character of the tumor varies considerably with the different periods of life. Tubercular, cystic, gliomatous, and sarcomatous varieties are frequent in childhood and early adult life. The tubercular largely predominating in childhood. Syphilitic growths are most common in young and middle-aged adults. The gliomatous, sarcomatous, and gliosarcomatous are most frequent during the latter period. In my experience I have found cystic growths much more frequent in adults than in childhood, although this is contrary to the results obtained from a study of tabular statistics. Carcinomatous growths are found most commonly during the degenerative period of life.

Sex.—After the age of fifty tumor of the brain is found with about equal frequency in the two sexes, but before this time, not excluding early childhood, the male sex suffers nearly twice as often as the female. It seems, then, that the explanation for the increased liability of the male sex to suffer from tumor of the brain must be sought in conditions pertaining to the developmental and active periods of sexual life.

Heredity.—It is still doubtful whether hereditary influences, excluding the tubercular and the carcinomatous, play any part in the causation of tumors of the brain.

It is probable that worry, anxiety, excessive alcoholic indulgence, cerebral congestion, and depressed states of the nervous system favor the development of cerebral growths in tubercular and syphilitic subjects, and they favor the formation of cancerous growths in other portions of the body and secondarily in the brain in certain persons, especially those who are the offspring of families in which the history of cancer is found.

Exciting Causes.—There is apparently a direct relation between injury of the brain and the development of tumor in only a few instances. It appears from the study of numerous cases that this relation is frequently overestimated.

Syphilis and tuberculosis are two of the most potent causes of tumors of the brain. I have no doubt that the time will come when we shall be able to attribute the origin of many tumors of the brain to micro-organisms.

Pathology.—According to Gowers, about four-fifths of the non-syphilitic tumors of the brain are either tubercular or sarcomatous (including the gliomatous). It is difficult to determine the frequency of syphilitic tumors of the brain, as so many cases yield temporarily or permanently to antisyphilitic treatment, and are lost sight of by the observer. The difficulty is still further enhanced from the fact that many cases of non-syphilitic tumors temporarily yield to antisyphilitic treatment, and may pass from under the physician's observations before their true nature is determined. The gliomata are found only in the central nervous system

and in the retina, and occur far more frequently in the brain than in the cord.

From a study of Starr's tables, consisting of analysis of three hundred cases of tumor of the brain in children, in nearly one-half the tumor was found in the cerebellum, pons, and medulla, while in the same number in the adult only a little more than one-fifth were located in this portion of the brain and its stem. The cerebellum in childhood appears to be a little more than twice as often the seat of tumor as in adult life, but in adults the cortex of the cerebrum is the seat of tumors six times as often as in childhood. From a study of the location of tumors it will be found that portions of the brain inaccessible to the surgeon's knife are much more commonly the seat of growths in children than in adults.

Tubercular growths are the most frequent of brain-tumors, especially in childhood, and their most common seat is in the cerebellum or other structures in the posterior cerebral fossa. In nearly one-half the cases the growths are multiple, and give rise to a confusion of symptoms, especially in relation to localization. Syphilitic growths, which are often accompanied by endarteritis or a low form of meningitis, affect the cerebrum much more frequently than the cerebellum, and are found on the surface, either at the base or on the convex surfaces of the frontal lobe and the convolutions near the fissure of Rolando. Gliomata and sarcomata are frequent forms of tumor of the brain. The former grow from the neuroglial tissue, infiltrate the surrounding portions of the brain, may be of considerable size, and are often scarcely distinguishable from the adjacent brain-substance; the latter develop from the connective tissue of the

membranes and vessels, and are frequently capsulated.

Prognosis.—The tubercular in children and the gummatous growths in young adults give the most favorable prognosis. In rare instances a sarcomatous growth may become capsulated and cease to grow or even decrease in size. The duration of life in tumors of the brain varies from a few months to two or three years. In exceptional cases life is prolonged for many years.

Treatment.—Persons suffering from tubercular or syphilitic growths should be kept as well nourished as possible, by means of a generous and nutritious diet, and general tonics, consisting of codliver-oil, iron, quinine, extract of sumbul, and arsenic, together with plenty of fresh air. In tubercular tumors alcoholic stimulation in many instances has seemed to be beneficial in my experience. The treatment should be different in the early stages of intracranial growths from that which should be adopted after the brain has received considerable damage and the tumor attained considerable size. In the early course of the disease the patient should have the benefit of the doubt when syphilis cannot be excluded. The more acute and irritative the symptoms in cases of syphilis of the brain, the greater the demand for mercury pushed rapidly to its constitutional effect; the slower the growth, the more likely that potassium iodide will be more beneficial than mercury. In most cases, while inunctions of mercury are employed vigorously, potassium iodide should be pushed to the point of tolerance. If with six weeks' active antisymphilitic treatment, carried to the point of tolerance, the symptoms do not begin to yield, it is probable that little will be accomplished by this method. It should be borne in mind that syphilitic subjects,

who are emaciated and anæmic, will not respond to active antisyphilitic agents until the nutrition has been improved. In the late stages of tumor of the brain prolonged and vigorous antisyphilitic agents are, to say the least, useless, if not cruel. In such cases, if improvement is not manifest within one or two weeks, vigorous measures should cease.

Headache is lessened by keeping the bowels open freely each day, the digestive organs in the best possible condition, and avoiding causes that are likely to increase the blood-supply to the brain. Cold to the head and a mustard plaster to the nape of the neck often relieve an annoying headache. Sometimes local abstraction of blood from the head by means of leeches to the temple or nape of the neck has been employed with benefit.

Such anodynes as *cannabis Indica* (Hering's extract or Parke, Davis & Co.'s normal liquid), with one of the coal-tar products, with or without codeine, should be employed before hypodermic injections of morphine are resorted to. Mustard to the neck and over the stomach, with cold to the head, will often relieve vomiting. Twenty to 30 grains of hydrate of chloral given by bowel in starch-water will often stop the vomiting as well as the general convulsions. Morphine hypodermically administered may be resorted to with confidence in the intractable cases of vomiting and general convulsions.

In case the tumor is accessible to the surgeon's knife, an operation for its removal should not be postponed if the symptoms have failed to be decidedly modified by antisyphilitic agents, vigorously pursued for a period of from six to eight weeks. No one should think of trying to remove a carcinoma or a melanotic sarcoma from the most accessible

regions of the brain, if the diagnosis of the nature of the tumor were possible or strongly probable. In some cases of tumor of the brain, in which there is no prospect of removing the growth, in the hopes of relieving the severe and agonizing pain a button of bone may be removed from over the seat of pain. In two personal cases this procedure has lessened or relieved the pain for prolonged periods. Several other similar cases, equally successful, have been reported.

J. T. ESKRIDGE.

Denver.

TUMORS OF THE BREAST.

Benign Tumors. — Benign tumors of the breast include *hypertrophy*, *adenoma*, *fibroma*, *cysts*, *osteoma*, and *tuberculous tumors*, besides galactoceles, which have been described under MAMMARY GLAND.

DISEASES OF.

Hypertrophy. — Hypertrophy of the mammary gland is usually met with between the twentieth and the thirtieth year. Its onset is quite insidious: the breasts begin to swell and steadily increase in size within a few months, until they have attained quite noticeable proportions. The enlargement may effect both organs, but sometimes only one of them. The breast keeps the shape of a hemisphere, but it is much firmer than usual. When, however, it has become very large, its weight causes it to fall below the abdomen, the upper portion forming a more or less large cutaneous pedicle. It sometimes assumes very great proportions.

The menstruation, as a rule, is disturbed. Pains appear which, though rare at first, become more and more pronounced. The patient, however, complains especially of extreme fatigue caused by the enormous weight. In some cases the breasts acquire almost in-

credible proportions; the patient loses her appetite, and occasionally dies of weakness and prostration, the autopsy showing no other alteration than the enlargement.

TREATMENT.—Iodide of potassium used early and in large doses and moderate pressure exerted by means of a flannel or rubber bandage sometimes retard or arrest the growth. If the tumor continues to grow, operative measures must be resorted to. Lactation seems to cause diminution, and has been followed by a cure in a few instances.

Adenofibroma.—Adenofibroma is frequently observed, and may appear at any age, but is usually met with between the ages of fifteen and forty-five years: during the sexual life. Menstrual disturbances and contusions of the breast are thought to exert a certain pathogenic influence.

SYMPTOMS.—Adenofibroma grows insidiously, but pain is only present in exceptional cases, and is usually increased during the menstrual period. The growth rolls under the fingers, and its surface is generally irregular, though the skin is unchanged and elastic under pressure. The nipple is not retracted, but there occasionally exudes from it a sero-sanguineous fluid.

The subcutaneous veins are only slightly, if at all, dilated, except when the tumor is very large. The axillary glands are usually normal, and the patient's general health is good. Very rarely these growths have been known to attain a considerable size in a short time, and the distended skin to become thinned and ulcerated. But the cutaneous tissues remain free and loose, and the ulcerative process presents none of the characteristics of cancerous ulcerations.

TREATMENT.—The progress of small

adenomata may be retarded by the local use of iodine and by slight compression, but, if they continue to increase in size, they should be excised. It is important to remember that the excision should be complete, the least remnant becoming, otherwise, a focus of recurrence.

Literature of '97-'98-'99.

Adenomata are not the harmless growths that many believe them to be, as there is a great probability that they may and do become cancerous. Medicinal therapeutics, external and internal, are useless. Early recourse to the knife affords a safe and satisfactory method of dealing with them. Balloch (*Amer. Jour. of Obstet.*, Oct., '98).

Galactoceles, or Lacteal Tumors. (See *MAMMARY GLAND*, volume iv.)

Cysts.—These growths are occasionally met with, and present only as symptom a localized enlargement, with unmistakable fluctuation.

Cysts are usually due to dilatation of the glandular portion of the lacteal tubes, followed by obliteration of the excretory duct; occasionally the sac develops in the interstices of the gland. In the tubular form a clear or gelatinous serum is exuded; the parenchymatous cysts, however, usually contain a sanguineous fluid. The cystic walls form part of the surrounding tissues, and cannot be peeled off from them without lacerating the latter.

A peculiar type of cystic disease of the breast has been described by Réclus. It consists in the development in the healthy tissue, and in both breasts at once, of a large number of cysts varying greatly in size from that of a pin's head to a hen's egg, and containing a more or less thick liquid, which may be either quite transparent or dark. Their growth is gradual and cause but little, if any, suffering. They feel as hard subcutaneous

masses which cannot be said to fluctuate. Réclus suggests their kinship to epithelioma and the theoretical possibility of their assuming a malignant type.

Clinical experience has sustained this view in some instances. As a rule, however, a pure cyst, when left to itself, remains benign, and, when operated upon under strict antiseptic precautions, does not recur.

TREATMENT.—A serous cyst should be aspirated with a small trocar, this being followed by the injection of iodine. If suppuration occur, or if the cyst is not cured by the injection, it should be opened and evacuated. Excision may have to be resorted to, but the fact that the walls of the cyst are not free from the adjoining tissues renders this procedure somewhat difficult.

Literature of '97-'98-'99.

During the past fourteen years 39 cases of retention-cysts of the breast have been noted. The majority of cases were in married women who had had children; in only 4 was there a history of mastitis, or sore nipples. The diagnosis of retention-cysts of the breast is easy when the cysts are superficially situated or in small soft breasts; they are smooth and rounded in outline and offer elastic resistance; the skin is never adherent, the nipple is normal, and they are usually painful, while small cancerous deposits are not usually painful. Puncture with an hypodermic needle is the final diagnostic test.

The treatment should be begun with aspiration, and incision should be undertaken only in case the cysts refill or are unusually large, or in case the patient is exceptionally nervous and is tormented with the idea of the development of carcinoma. Patients with general cystic diseases are advised to wait, as sometimes the condition remains without change; advanced cystic disease calls for excision of the breast. There is little evidence that this condition degenerates into carcinoma; if so, it is

very slow in development. William T. Bull (Med. Record, Apr. 22, '99).

Miscellaneous Growths.—Among the growths rarely met with are **OSTEOMA** and **LIPOMA**. The former especially are very rare. **CALCULI** have occasionally been found in galactoceles, and cysts have been met with whose walls have become calcareous. Cases in which the entire breasts have hardened sufficiently to simulate stone when touched have also been recorded.

Semimalignant and Malignant Tumors.

Sarcoma.—Pure sarcoma is rarely met with; it is usually associated with other morbid conditions of the mammary tissues; hence the names *adenosarcoma*, *fibrosarcoma*, *myxosarcoma*, *cystosarcoma*, given these growths and which denote their associations.

SYMPTOMS.—Clinically sarcoma may assume the type of a rather *circumscribed* tumor, which is immovable, lobulated, and firm. After a time the elevations project somewhat, and may become very soft, and finally become foci of ulceration. The semimalignant nature of the growth then appears and the axillary glands may become enlarged.

A second form is the *diffuse* sarcoma, which rapidly invades the entire gland, but follows otherwise about the same clinical course of the first variety. In sarcomas associated with soft tumors, such as adenoma or myxoma, the tumor is less hard, and suggests the benign forms with which the sarcomatous type is combined.

DIAGNOSIS.—From cancer of the breast sarcoma is distinguishable by the following characteristics: It does not adhere to the skin, though this may be distended, thin, and even ulcerated, owing to the size of the tumor. The en-

tire gland is not, as a rule, affected and the nipple is not retracted. The axillary lymphatics are seldom enlarged. There is but little pain. Again, sarcoma occurs in young adults, whereas cancer rarely appears before the age of forty-five years. It is frequently observed in men and is usually in them of traumatic origin. They are often mistaken for abscess and opened.

PROGNOSIS AND TREATMENT.—Sarcoma is ranked next to cancer as regards malignancy. It may also recur after extirpation, and may become generalized in the viscera. The fact that it does not always do so causes this variety of growth to be classed as semimalignant. It should be removed, including the superjacent skin. This is easily accomplished by raising the mass with one hand and including it within two semilunar incisions, the tips of which meet. No diseased tissue should be allowed to remain.

Cancer of the Breast.—Out of 750 cases of mammary diseases of all kinds witnessed in St. George's Hospital, London, by Marmaduke Sheild (Brit. Med. Jour., May 3, '96) about one-half—353—were carcinomatous.

The predisposing and exciting causes of cancer in this location are almost invariably explainable through a reduction of the powers of resistance of the mammary tissues, brought on through trophic disorders. These, in turn, may be due to induration following the various forms of mammitis (see **MAMMARY GLAND**), abscesses, Paget's disease, especially; and of disorders of the nipple: abscess, psoriasis, eczema, etc. Traumatism is a fruitful exciting cause when the breast has been weakened by disease; old age enhances the chances of a local morbid development by decreasing the local powers of resistance.

Varieties.—Two forms of cancer of the breast are met with, the *scirrhus*, or hard, cancer, in which there is excessive development of fibrous tissue, and the *encephaloid*, or soft, cancer, in which the epithelial elements play the leading rôle. (See **TUMORS**, this volume).

Scirrhus, or Hard, Carcinoma.—In this variety the initial symptoms vary with the location of the primary cancerous focus. In deep-seated cancer the gland may become enlarged and hard, but not essentially deformed. The skin adheres closely to the mammary tissues, and the gland itself adheres to the mammary walls. In other cases the breast practically collapses and atrophies and the nipple becomes retracted, constituting the atrophic, or withering, form of scirrhus. In still another type the cancerous process affects a certain part of the breast only, and thence invades the whole gland by throwing out fibrous bands or strips, which radiate through the organ in all directions. The surface of the breast may then assume various types of irregularity, with promiscuously distributed undulations.

The tumor may be essentially cutaneous at first and subsequently invade the deeper tissues. It then appears in the form of irregularly disseminated *plaques* or hard, superficial areas, which unite and may involve a large portion of the superficial tissue. The skin appears as though tanned; and is hard, rough, thick, and red. This scirrhus transformation may gradually affect the whole anterior portion of the thorax, which thus appears to be covered with sole-leather-like covering; hence the name "*en cuirasse*" given this type of cancer. Sometimes the disease appears in the form of nodules varying in size from that of a cherry to a millet-seed. These nodules are hard and vary greatly in num-

ber. They may, however, remain in the same condition a long time if let alone, but frequently ulcerate. If removed they rapidly recur. They are due to penetration of the cancer-cells into the perivascular lymph-spaces of the cutaneous vessels. When scirrhus of the skin follows upon a deep-seated cancer, similar nodules may develop around the edge of the cancerous ulcer. Their appearance indicates a tendency to spread and to become generalized.

Scirrhus, or hard, cancer, when left to itself, transforms the whole breast affected into a stone-like mass. Into this the nipple is more or less drawn by contraction of the milk-ducts through infiltration of the latter with young cells and subsequent metamorphosis into fibrous tissue. If the cancerous focus is far from the nipple, the latter may only be somewhat distorted through irregular tension of the skin.

Deep or superficial ulceration may occur, which differs greatly from that observed in the epithelioma of the breast. The ulcer resembles a crater with irregular, hard, everted edges, and whose base is covered with foul, unhealthy granulations, giving off a thin, offensive discharge. Such ulcers are apt to bleed, and severe hæmorrhages may occur. The axillary glands become involved early; but their detection at first requires careful examination. They gradually enlarge, and by pressing upon the surrounding vessels and nerves may give rise to œdema of the arm or to neuralgic pains. The entire lymphatic system of the trunk is exposed to contamination; hence the visceral complications often witnessed.

Suffering only becomes serious when the tumor has reached a certain size. Pain of a stinging or burning character is sometimes complained of; involve-

ment of nerves often cause it to be neuralgic and persistent, especially in the shoulder and arm. The ulcerative process, the general toxæmia incident upon the presence, the purulent mass, and the mental sufferings of the patient bring on exhaustion which finally end in death.

Encephaloid, or Soft, Carcinoma. —

The encephaloid variety of mammary cancer, though less frequently met with than scirrhus, is nevertheless common. It always starts in the gland itself, and only affects the skin at a later period. Its onset is insidious. It may have existed for some time unperceived by the patient. A hard tumor located in the gland is first noticed; this may be free from surrounding or fixed, according to the time it is detected. It may also present nodules varying in density, owing to the presence of cysts and sanguineous infiltration. At first the skin is free and traversed by unusually-prominent bluish veins, some of which finally become varicose; spots of redness then appear, the precursors of adhesion to the skin of the cancerous mass. This occurs at an early stage, and is caused by infiltration of the cancerous elements into the tissues. The whole tumor then becomes a reddish, fluctuating mass which soon degenerates and becomes fungous; it then bleeds easily when touched, and gives off a foul odor. Burning and shooting pains, which are more severe and appear earlier than in scirrhus cancer, occur, and steadily increase in intensity. Retraction of the nipple also occurs, and engorgement of the lymphatics can be detected at an earlier date.

The ulceration differs essentially from that of scirrhus. Instead of being surrounded with a harder border, forming a crater-like cavity, it assumes the aspect of a large fungous sore. The least touch causes it to bleed, and hæmorrhages are

much more frequently observed than in scirrhus, but fortunately are arrested with less trouble. Cachexia also appears earlier. All the acute symptoms are aggravated, and complications in remote organs are more frequently observed.

Diagnosis.—The anxiety caused by a growth in this region renders a careful differential diagnosis of unusual importance.

The first question to be determined is whether the tumor be benign or malignant. To determine the exact nature of a tumor at the very onset is often impossible, but this difficulty gradually decreases as time progresses. Still, there are at all times landmarks upon which the surgeon may base a guarded opinion even early.

As a rule, benign tumors occur before the age of thirty-five or forty, while the malignant growths are seldom met with before that age. Again, the evolution of the neoplasm is much more rapid in malignant tumors than in the benign. These usually remain free or detached, and, if at all superficial, can be rolled under the finger, indicating the absence of adhesions. In malignant tumors, on the contrary, adhesion to all the surrounding tissues becomes at once evident, their limits, even in the beginning, being practically indefinable, while later on the cutaneous and all the underlying tissues become incorporated in the tumor.

The density of the growth and the aspect of the skin also afford a clue. Benign growths are usually soft and elastic when pressed upon, while malignant neoplasms are hard and lumpy. The skin retains its softness and usually rides freely over the benign tumor, while over a malignant one the skin becomes abnormal and assumes a leathery aspect.

In benign growths the nipple usually

remains free or merely distorted by the change in shape of the breast. In cancer it is drawn into the organ and held fast in that position by fibrous bands.

An oozing of blood from the nipple of a breast in which no appreciable change can be seen is a serious symptom: a precursor of the development of cancer. The discharge may precede the appearance of tumor several years. Delbet (*Bull. Méd.*, Dec. 4, '95).

The lymphatic glands of the axilla rarely, if ever, become enlarged in benign growths; if they do at all, the enlargement is slight. In malignant growths they are always more or less enlarged, and steadily increase in size as the disease progresses.

Benign tumors very seldom cause inconvenience to the patient except by their volume and their weight. Malignant tumors, on the other hand, are attended by more or less pain, usually of a lancinating character. The suffering becomes more acute from day to day.

Ulceration sometimes occurs in benign tumor through pressure, but only when the growth is very large. The edges of the ulcerated portion remain thin and free, and there is no fœtid or sanious discharge. In cancer, as stated, ulceration is one of the salient features and is characterized by marked foulness. The general health usually remains good in benign tumors. In malignant tumors the patient soon becomes cachectic and shows marked evidence of deterioration. The œdema of the arms and the complications alone belong to the malignant types of growth.

Literature of '97-'98-'99.

Protest against the employment of exploratory puncture as an aid in the diagnosis of breast-tumors. There are two dangers attending this procedure: (1) that of overlooking a carcinomatous nodule really present, and (2) that of spreading an extensive and hopeless car-

cinomatous infiltration. Maurice H. Richardson (Boston Med. and Surg. Jour., Oct. 27, '98).

Treatment.—Internal remedies innumerable have been proposed as specifics, but time has in all demonstrated their worthlessness in *bona fide* cases of cancer. Even the local methods, topically or hypodermically employed, and which will be described at the end of this article, are open, if effective, to serious objections, and should, therefore, only be resorted to in inoperable cases or when the patient, through fear or for other reasons, will not allow the use of the knife. The surgeon must, therefore, choose between the palliative method, which resolves itself into reducing the patient's sufferings during her gradual progress toward death, and the radical method, which gives her, if the tumor is not too far advanced, a good chance to recover. Especially is this the case since greater freedom has become the rule in the removal, not only of cancer of the breast, but of the contaminated glands. Indeed, nowadays few operations for well-developed cancer can be considered radical unless removal of the primary growth is accompanied by prophylactic extirpation of its tributary lymphatic areas.

The experience of the last two decades, and more especially of the last ten years, has shown, according to statistics, collected by Rudolph Matas (Phila. Med. Jour., Sept. 17, '98), by more thorough operating, the chances of recurrence are greatly diminished. While the results of the *older* operations give the following percentages of local recurrences: Billroth, 85; Czerny, 62; Fischer, 75; Gusenbauer, 64; Volkmann, 59; and Gross, 68; the *later* operations show much better results: Halsted, 22; Watson Cheyne, 18; Rötter, 14; and Dennis, only 5 per

cent. of local recurrences within a period of three years. Joerss's estimate (1897) based upon a study of 76 cases operated upon by four surgeons (Heidenhain, Rötter, Helferich, and Watson Cheyne) gives 30.3 per cent. of local recurrences within three years.

Far more important is the actual number of cures obtained by present methods. Here again the statistical evidence is encouraging. Billroth (1876) claimed 4.7 per cent. of cures; Küster (1881) 21 per cent.; Koenig, 23; and Bergmann, 39; while the average of Rötter, Helferich, and Watson Cheyne's cases (1896) was 49.5 per cent. Watson Cheyne found that, while in a collection of 1491 cases, obtained from various sources and operated upon by older methods, 14 per cent. had been cured, 111 operated by newer methods had yielded 34 per cent. of cures.

Unfortunately many cases are not seen sufficiently early to warrant operative procedures. Glandular involvement has often been allowed to extend to the axillæ, when the chances of a successful issue are reduced. These become inoperable cases, however, when scattered cancerous tubercles are met with over large areas, indicating extensive infiltration of the skin,—i.e., undefined limits; or, when the cancer *en cuirasse* type has been assumed, and has so progressed as to involve a large part of the surface. They become especially so when the internal viscera—the liver, the lungs, etc.—show indications of metastasis. Great and persistent œdema of the arm is considered as a contra-indication, but it should not stand as such in all cases.

Literature of '97-'98-'99.

Case of cancer of the breast which had provoked a considerable œdema of the arm and of the shoulder, the family urging operation and the patient being sub-

jected to horrible pain. Operation palliative, and not radical, was performed, but in order that the pain should not return in case a relapse should occur, the brachial plexus near its juncture with the spinal column was resected. Recovery occurred rapidly without the least local symptom and with union by first intention throughout. Depage (*Gaz. Hebdom. de Méd. et de Chir.*, July 15, '97).

Statistics of operation for cancer of the breast in Scandinavian countries:—

Mortality of the operation itself, 2.28 per cent.

Death from relapse, 56.38 per cent.

Reoperated, 9.34 per cent.

Death without relapse, 3.30 per cent.

No relapse, 28.70 per cent.

A much more radical operation than usually performed recommended as to the removal of the skin, fatty and connective tissue, muscles, and glands. Dahlgren (*Nor. Surg. Congress; Phila. Med. Jour.*, Sept. 9, '99).

A class of cases in which forbearance should be the rule is that occurring in old women, in whom a cancerous growth may, without giving rise to serious suffering, extend over several years: ten to twenty sometimes. An operation in such cases would soon be followed by recurrence and earlier death. Encephaloid growths occurring in young women seldom warrant operative procedures when at all advanced. Their evolution is extremely rapid in such cases, and excision is almost always followed by recurrence.

Barring the above-mentioned features, extirpation is indicated in every case. Many prominent surgeons, indeed, recommend the removal of all benign growths, since they often become the foci for the development of malignant neoplasms. Even when relapses occur successively, the operation prolongs life, tranquillizes the patient, and greatly decreases her sufferings. When in addition the increasing proportion of cures afforded by modern thoroughness and an-

tiseptic methods is considered, the duty of the medical attendant becomes imperative.

The prohibitive features enumerated having been eliminated by a careful examination, the supraclavicular spaces and axillæ should be carefully examined for enlarged glands. When enlarged supraclavicular or axillary glands are detected their influence upon the surrounding tissues is a good gauge as to their size. The presence of pain, slight cedema, stiffness, etc., should be carefully looked into, and, if none of these are complained of or detected, the chances that the glandular involvement is slight are very great. Some surgeons recommend an exploratory incision under anæsthesia to ascertain that the glandular involvement before operating is not excessive. This is unnecessary, since the necessity of such a step proves that the case is an operable one.

OPERATION.—The most promising procedure is that of Halsted, who contends that the pectoralis-major muscle entire, except its clavicular portion, should be excised in every case of cancer of the breast, because the operator is enabled thereby to remove in one piece all of the suspected tissues. J. Collins Warren also emphasizes the importance of thorough removal of all suspicious tissues, including a large margin of the cutaneous covering of the breast, a careful deflection of the edges of the wound, removal of the subcutaneous fat for a considerable distance around the mammary gland, the removal of the pectoral muscles, and a minute and painstaking dissection around the sheath of the axillary vessels. Arbuthnot Lane also removes the pectorals, carefully dissects away every particle of glandular and areolar tissue from the axilla; also, if necessary, dividing the clavicle, and

clearing out the subclavian triangle if need be.

What such thorough work affords in results is well illustrated in J. Collins Warren's report, in which 22 cases operated upon under the improved technique gave 8 cases cured, a percentage of $36\frac{3}{10}$ per cent.; all cases in which recurrence had not taken place had not occurred at the end of three years.

Literature of '97-'98-'99.

Three years ago 61 cases operated upon at periods varying from one month to six years were described; in 21 of these from three to six years had then elapsed since the date of the operation. From three to nine years have now elapsed since these 61 cases were operated upon. Their present condition, as far as it has been possible to ascertain, is: Of the 61 patients 30 remain free from recurrence.

Further list of 38 patients operated upon up to the end of 1897. In these from one to three years have elapsed since the operation: 26 patients remained well without recurrence; one refuses to say how she is, but appears well; in 1 the result is unknown; 1 died suddenly about a fortnight after the operation; 7 died of recurrence; 1 recurred and has probably died; in 1 the disease recurred slightly, has been operated upon, and appears well.

In the total of 99 cases above, in which from one to nine years have elapsed since the operation, 56 certainly have as yet had no recurrence.

Conviction that about 50 per cent. of all cases of cancer of the breast will recover from the operation and remain free from recurrence if the original procedure is drastic enough. Especially is it necessary that the removal of the skin should be free. The patient's chance lies in the first operation. Watson Cheyne (Lancet, Mar. 18, '99).

The breast should first be carefully cleansed and aseptized as far as possible and the axilla shaved and treated in the same manner. The incision is

then begun at the anterior axillary fold, and, describing an ellipse embracing the whole gland, is then brought back to the starting-point. The skin and fat of the regions traversed should be penetrated down to the muscular tissues beneath, the organ being then detached from below upward, *i.e.*, progressing toward the axilla.

The supraclavicular region is almost invariably cleansed out by Halsted (Trans. Amer. Surg. Assoc., '98) at this stage, and he found that removal of the supraclavicular fat and lymphatics is best done from within outward and from below upward. The subclavian vein being the starting-point in the dissection of both the infraclavicular and supraclavicular regions, it is unnecessary to remove the clavicle and useless to divide it. By elevating the shoulder the clavicle can be raised an inch or more away from the first rib. The fingers can be pressed from the supraclavicular to the infraclavicular and to the subscapular regions under the clavicle, and any fat in the latter region, near the internal or the posterior border of the scapula between the serratus magnus and subscapular muscles, which could not be drawn out through the neck. To excise the supraclavicular tissues a vertical incision is used parallel with the sterno-cleido-mastoid muscle near its posterior border; a few of the posterior fibres of this muscle are divided and the junction of the internal jugular and subclavian veins is exposed. At the angle of junction of these veins the dissection is begun. The omohyoid is divided at its tendinous part, the two bellies of this muscle being drawn out of the way. The supraclavicular fossa is cleansed out or stripped, with very few exceptions, at the primary operation. The rule should be to operate on the neck in every case.

The minor as well as the major pectoral muscle is removed; the insertion of the major, and then its origin and the origin of the minor being divided, before the subclavian vein is exposed, first at its inner part; and the axilla stripped of its contents and its anterior wall at one time from within outward and from above downward. The mass to be excised must always be circumscribed with a circular or an oval incision, and an additional cut made to expose axillary and jugular veins. The operation is performed in an absolutely bloodless manner. In all cases the wound is grafted immediately; this is done by cutting grafts from the patient's thigh as large as or larger than one's hand. A single one of these large grafts may be enough to cover the raw surface. In cutting a graft of this kind the skin is made tense by a board which the operator slides along the thigh just in front of a large amputating knife or catlin. The graft is spread, raw side up, on a piece of rubber tissue, and from the latter is readily transferred to the breast-wound. It is finally covered with silver foil and tissue-paper, and need not be looked at again for two or more weeks.

When such radical measures are not required, and a simpler operation is warranted by the limits of the tumor, the following procedure may suffice: The breast is carefully asepticeized by washing, and bathed with a mercuric-bichloride solution, and the axilla is shaved and treated in the same manner. An incision is then made, also from the axilla, but anterior to it, extending downward and around the tumor, the latter being included in the ellipse formed, and meeting the starting-point. Even if the growth be exceedingly small, a wide margin should be removed with all suspected tissue. The knife should penetrate clear

down to the muscular aponeurosis, from which the mass can easily be detached; but if the aponeurosis is adherent it must be removed. If any muscular fibres also show adhesions, the Halsted operation should be resorted to. The vessels should be rapidly caught to avoid hæmorrhage as the case proceeds.

Examination of the axillary ganglia is warranted in all cases, and their careful dissection is always indicated, when there is the least suspicion that they may be involved. They are unmistakably so in over 60 per cent. of cases. The wound is then to be carefully washed with a bichloride solution, after carefully arresting all the bleeding vessels. The antiseptic solutions used should be lukewarm, to prevent chill, the operation being rapidly performed in a warm room for the same reason. The two edges of the wound should then be sutured, after having placed a drain at each end of the wound. The whole should then be dusted with iodoform, and covered with a thick layer of antiseptic absorbent cotton, held in position by a broad bandage tightly fastened around the chest. When antiseptic precautions have been carefully carried out, union takes place at once. The dressing should not be removed until the third or fourth day, to remove the drains and sutures. These should be replaced by strips of linen impregnated with iodoform collodion.

The responsibility of the surgeon does not end with the simple removal of the growth from breast. Patients to be placed under best hygienic conditions and to be followed from year to year. Powers (*Jour. Amer. Med. Assoc.*, Mar. 2, '95).

Literature of '97-'98-'99.

Halsted's operation the preferable one for carcinoma of the breast, but too little skin is removed in most cases and the remaining skin may be a source of further infection. After the removal of

an extensive area of skin, two parallel, horizontal incisions made from the upper and lower extremities of the wound, thus outlining a quadrilateral flap. These incisions are continued to the anterior axillary line of the opposite side, and two short vertical incisions are made from them toward the breast. It is possible by sliding this flap to cover the exposed surface. Assaky (Münch. med. Woch., Mar. 7, '99).

When the breast has been removed it is important to ascertain whether any cancerous tissue has been left. This is ascertainable at least as far as the tissues through which the incision has passed, by means of the proceeding recommended by Stiles, of Edinburgh. He gives the steps of the procedure as follows: "1. Mark the position of the breast by a slight incision extending both on the breast and on the skin which is to be left. This is to enable the operator to identify the position, and therefore the corresponding surfaces of the breast and the wound after the removal of the breast. 2. Wash the breast in water to remove all traces of blood. This is important, because after treatment with nitric acid the blood becomes blackened and difficult to remove, and therefore greatly obscures the appearances which the acid brings out. 3. Submerge the whole organ in a 5-per-cent. aqueous solution of nitric acid (B. P.) for about ten minutes; that is to say, during the time the surgeon is clearing out the axilla. 4. Wash in plenty of running water for five minutes. 5. Place in methylated spirit (undiluted) for two or three minutes. 6. Examine the whole surface very carefully to ascertain (a) whether any part of the tumor is exposed upon the surface, (b) whether any locally-disseminated cancer-foci are exposed upon the cut surface, or (c) whether breast-tissue is exposed."

All the cancerous tissues treated in this manner are rendered a dull, opaque white, indicating that more tissue must be removed from the corresponding spots in the wound.

TREATMENT OF INOPERABLE CASES.—When the growth cannot be removed, palliative measures must be adopted. The organ must be relieved of all pressure, and the movements of the corresponding arm restricted as much as possible. The use of morphine and atropine hypodermically in such cases is fully warranted, the object being to curtail suffering, even if very large doses have gradually to be reached. Locally, boric acid, directed over the growth, or a solution of acetate of lead, 20 grains to the ounce, sprayed over it, are useful procedures. Local applications of solutions of the extract of opium or belladonna sometimes quiet the suffering.

Bernart recommends, as a curative measure in inoperable cases, interstitial injections of a solution of salicylic acid, 15 minims to 1 drachm of a 6-per-cent. alcoholic solution being used after strict antisepsis. From 10 to 15 injections are said to produce considerable alleviation.

Hasse, of Nordhausen, has used injections of alcohol for more than 20 years in the treatment of inoperable cancer, and 4 cases of this kind in his practice are now cured. He uses the same method in cancer of the breast, and believes that cure could be effected in these cases by surrounding the breast with cicatricial tissue by means of alcohol injections. It is preferable, however, to extirpate the breast and treat recurrences by the injections. In this manner he obtained radical cure in a case declared inoperable by Volkmann. Vulliet, of Geneva; Kuh, of Chicago; Young, of Bloomington; and others have also obtained good results from this

method. Hassel used alcohol diluted one-half, or even more with very sensitive patients, having found it less painful, while equally effective. One, or at most two, injections are made at a time, drawing the breast out and inserting the needle in such a manner as to cause the alcohol to penetrate into the retromammary cellular tissue beyond the middle of the gland. The contents of the syringe should flow out gradually on gentle pressure of the piston. If there is resistance it should be withdrawn a little and the point inserted sidewise in another direction. In this way the retromammary space is filled with the alcohol, 4 to 10 cubic centimetres for small tumors and 10 to 20 cubic centimetres for larger ones. One must be careful to keep well in the space behind the tumor. After the needle is first introduced it should be withdrawn to see if any blood flows out of the needle-hole, showing that the needle has penetrated a blood-vessel. If it has, the syringe must be cleansed and inserted in another place. The injections are made once or twice a week at first, and then later once in two or three weeks. These injections are, unfortunately, rather painful.

Removal of Benign Tumors of the Breast.—The operation does not vary from the simpler operation used for cancer, but removal by raising the mamma as a flap from the chest-wall and extracting the tumor from behind, first suggested by Gaillard Thomas, may sometimes be used. In a case operated by T. S. K. Morton, in which a benign growth was to be removed, it was found easily feasible to turn up the breast as a flap or trap-door so as to extract the growth without leaving a disfiguring cicatrix. An incision five inches in length was made, semicircular in form, in the line of the fold formed at the

junction of the lower portion of the breast-skin with that of the chest-wall. This was carried down through a considerable amount of fat until the sheath of the pectoralis major was exposed. The loose cellular attachments of this to the capsule of the breast were then with great ease broken up by blunt dissection and an occasional snip of the scissors until the breast could be turned upward upon the chest-wall below the clavicle. The posterior wall of the capsule was now opened in a direction radial to the nipple over the tumor. This was found to be capsulated and very loosely adherent to the pocket among the gland-acini, which it had evidently formed by its movements. Blunt dissection by a forefinger freed it at a sweep at all points save the upper and outer, where a firm adhesion was discovered, which required division by the knife, but without opening the capsule of the growth. No ligatures were required. The gland was turned down into its normal position and the skin-margins of the wound united by a subcuticular continuous silk suture.

While this method is of value in closely-diagnosed cases, the operator must not be tempted to use it where there is the least doubt of the non-malignant character of the disease.

Tuberculosis of the Breast.

There are two characteristic varieties of mammary tuberculosis: the *disseminated* nodular form and the *confluent*. The nodular variety is characterized by the development of single or multiple hard nodules, only slightly painful and at first non-adherent to the skin. The process is exceedingly chronic, and only after the lapse of several years do the nodules break down and form suppurating fistulas. The confluent variety is characterized by a more acute onset, greater pain, and rapid enlargement of

the breast. It is more common than the nodular variety. Retraction of the nipple has been reported in two cases. If the disease extends to the axillary glands, it pursues a much more rapid course than in the mammary gland. Occasionally the tuberculous process leads to the formation of a cold abscess, but this is rare, and never occurs before puberty. In many cases it is impossible to establish a diagnosis of tuberculosis; but, when the disease is far advanced or there are foci of the same trouble in other organs, the diagnosis is comparatively easy. (A. E. Halsted and E. R. le Count [Annals of Surg., Dec., '98].)

SYMPTOMS.—The symptoms of tubercular mastitis are pain and tumor. The tumor may consist of one or more nodules, firm, hard, and freely movable with the gland. The skin may be freely movable over the growth, but frequently is attached. The nipple may or may not be retracted, and occasionally the entire breast becomes involved in one large, nodular, unyielding, brawny mass. The diagnosis is usually difficult, and is most important when the differentiation between tuberculosis and carcinoma is imperative. Under certain conditions it is impossible to distinguish them clinically. The infallible means of differentiation are the microscope and bacteriological culture. The axillary lymphatics are enlarged in three-fourths of all secondary cases; in other instances axillary involvement may be apparently absent; occasionally cervical glands are also infected. (C. C. Warren [Med. Rec., Oct. 1, '98].)

Literature of '97-'98-'99.

Primary tuberculosis of the mammary gland is more frequent in women than in men and, usually, affects individuals of middle age. Pregnancy and lactation undoubtedly have influence upon its devel-

opment. Three ways of infection are possible; infection by the lymphatics and infection by the blood-vessels, both of which have been clearly demonstrated, and infection by the galactophorous route. The latter method has not been satisfactorily demonstrated, and, if it exists at all, is very rare.

In the region of the mammary gland, as in all other organs, the lesion is interstitial in the beginning; the giant-cell is not of epithelial origin and is not situated in the acini. The tuberculous lesion may appear after the infection of the axillary lymph-nodes with the tubercle bacillus. Cuneo (Thèse de Paris, '99).

ETIOLOGY.—Of the cases of tuberculosis of the mammary gland, 89 $\frac{9}{10}$ per cent. occur in females. The disease is most common between the ages of twenty and thirty-five. Mammary tuberculosis may be primary, depending on infection through the milk-ducts or fissured nipples; or secondary, the disease extending from contagious foci in the chest (C. C. Warren). According to Reerink (Beit. zur klin. Chir., B. 13, H. 1, '95), extension from surrounding structures is the commoner method.

TREATMENT.—The treatment of primary mammary tuberculosis, as recommended by A. E. Halsted and E. R. le Count (*loc. cit.*), consists in complete removal of the breast and axillary glands. In the rare cases of cold abscesses these may be aspirated and iodoform emulsion injected.

Literature of '97-'98-'99.

The treatment indicated is removal of a wedge-shaped piece from the infected region. When the axillary lymph-nodes are involved, curettement of this region should be added to the excision of the gland. When patients refuse surgical intervention, a cure may sometimes be obtained by puncture of the primary cold abscesses of the mammary gland, followed by the injection of an ethereal so-

lution of iodoform. This has resulted favorably in a number of instances. Cuneo (Thèse de Paris, '99).

TUMORS OF THE LARYNX AND LUNGS.

Tumors of the Larynx.

Symptoms.—The location of a laryngeal tumor, its size, and its nature bear considerable influence upon the symptomatology. A growth situated anteriorly in the anterior commissure may, though small, so prevent approximation of the cords as to cause complete loss of voice; on the other hand, a large soft growth located below the cords may not interfere with adduction and only give rise to the symptoms of chronic laryngitis. Paroxysmal hoarseness is often observed in such cases, especially after loud talking or laughing. A small tumor situated above the cords may also give rise to very little trouble and cause no subjective symptom. In the great majority of cases, however, persistent hoarseness is the first manifestation. Dyspnoea follows and gradually increases until orthopnoea is threatened. If at this stage the nature of the trouble be not recognized and the growth extirpated, the patient dies asphyxiated. Small growths with long pedicles are apt to titillate the laryngeal mucous membrane, and give rise to cough or spasmodic retching. A rattling noise or coarse gurgling is also sometimes heard when such growths are present.

Laryngeal tumors may be *benign* or *malignant*.

Benign Tumors.—Benign tumors usually grow slowly, and dyspnoea only comes on late in their history, unless an acute cold or any local inflammation causes temporary infiltration of the tissues, when dangerous symptoms may suddenly supervene.

Singers' Nodes.—These small growths,

usually observed on the superior surface of the cords, or near their edge, and usually in the anterior thirds, are the result of overuse of the voice. The first manifestation is fatigue unusually soon after beginning to sing; this is followed by gradually increasing hoarseness. The tumor varies from a pin's head to a small split pea, in size, and forms the centre of an areola. Often the same spot in the opposite cord is also the seat of a growth. There are often several on both cords.

Papilloma.—This variety of growth is commonly met with, especially in children, and represents over one-half of all laryngeal tumors encountered in practice. It is ascribed to inflammatory disorders of the larynx, especially when in subjects suffering from diathetic disorders, or showing familial traces of syphilis or tuberculosis. They are often attached to the anterior portion of the cord, near the commissure, and may be sessile or pedunculated. The numerous papillæ cause their surface sometimes to resemble that of a raspberry, especially when dark red in color. They may be yellowish, white, or pinkish. They are occasionally observed at birth, the infant being aphonic and showing evidence of dyspnoea. Digital examination is necessary to recognize the condition in small children. These growths are only benign in young subjects, but when they occur after middle life they should be looked upon with suspicion. Tuberculous growths of the larynx may be taken for a papilloma.

Fibroma.—Fibromata may be assimilated to nasal polypus, though they are more opaque and resistant to pressure. They are smooth and usually sessile or pear-shaped, may be whitish gray or reddish, the latter color being due to sanguineous extravasation, through coughing, hemming, etc. They are generally found near the anterior commissure upon

the cords, below them, or upon the ventricular bands. They sometimes become sufficiently large to completely fill the larynx and cause asphyxia. Overuse of the voice is also thought to be their main cause; they are usually found in men.

The other varieties of benign growths occasionally met with in the larynx are *cysts*, *angioma*, *chondroma* and *adenoma*, and *lipoma*.

TREATMENT OF BENIGN TUMORS.—In singers' nodes rest is the first requisite, talking especially being as much as possible avoided. The local use of astringent solutions is generally useless. The local application of chromic acid with a suitable instrument and by an expert, or galvano-cauterizations, or, again, the use, for sufficiently large growth, of the laryngeal forceps, alone affords satisfactory results.

In the cases of all other benign growths removal is also necessary. In small sessile growths this may sometimes be accomplished by chromic acid or galvano-cautery. As soon, however, as a neoplasm reaches beyond the dimensions of a split pea, removal with forceps, Fauvel's or Mackenzie's, should be resorted to, after anæsthetizing the larynx with a 20-per-cent. solution of cocaine. Tracheotomy sometimes becomes suddenly necessary when the growths are large. General anæsthesia under such circumstance can rarely be used, lest the saturation of the pulmonary residual air with the anæsthetic cause death. Benign tumors do not recur at the same spot, if they recur at all.

Malignant Tumors.—The proportion of malignant as compared to benign growths, as shown by Semon's statistics is about 1 to 7, but the fact that the former are more likely to be reported than the latter would tend to suggest that this proportion is fallacious. One ma-

lignant case in 20 cases would, judging from the specialist's average experience, probably be nearer the truth.

CARCINOMA.—Cancer of the larynx is somewhat more frequently observed in men than women, and, as is the case with this variety of growth in other parts of the organism, the majority of cases, about 66 per cent., are observed in subjects between the fortieth and sixtieth years. Cases are, though rarely, met with in children. Epithelioma is the variety usually observed, though all forms of cancer, even scirrhus, have been encountered in this situation.

Besides the symptoms observed in other forms of laryngeal tumor, hoarseness, dyspnœa, cough, etc., glandular enlargement in the neck, and dysphagia usually appear, sometimes early in the history of the case. Pain, another feature not complained of in benign tumors, is quite a prominent symptom and in some cases becomes intense. It is usually of a lancinating character and in some cases radiates toward the ear. The breath is foetid, the general health is undermined through general toxæmia and deficient nutrition, and death usually occurs from exhaustion. In some cases, however, ulceration through the coats of a large artery may cause sudden death from hæmorrhage; fatal pneumonia may be brought on by the aspiration of *detritus*, or asphyxia may be induced through the entrance into the laryngeal aperture of masses of food.

The laryngoscopical image afforded at first varies greatly in different cases and according to the location. It may at first resemble a benign tumor, and be taken for it: one cord may simply be enlarged, rounded at the edge, and slightly congested; a small ulcer, resembling an abrasion, may suggest syphilis, especially when the edges of the ulcer are sharp-

cut and yellowish; a grayish projection or ulcer may suggest tuberculosis, etc. Elimination by examining the sputa for tubercle bacilli, or the administration of iodide of potassium is often necessary in such cases to determine the true nature of the growth, and sometimes a small piece must be nipped off with forceps for microscopical examination. The development of the tumor is also irregular. Fungous masses, burrows, masses of necrosed tissue, and thick secretion, etc., make up a picture that is never forgotten when once seen.

The chances of recovery are absolutely *nil* when an early operation, including thorough removal of the growth, cannot be carried out. When such a procedure can be resorted to satisfactorily the prognosis becomes comparatively favorable.

TREATMENT.—The safest rule as to the extirpation of laryngeal carcinoma resumes itself into instrumental methods whenever the case is seen near its incipency. If there appears, after careful examination, to be no peripheral involvement, and the growth is so situated that it can be, as it were, punched out with considerable surrounding tissue with special cutting forceps, this should be resorted to. An ulceration or thickening near or the edge of a cord or a ventricular band may thus be enucleated. Such cases are unfortunately comparatively rare, and the laryngologist is usually consulted when the cancerous process has already advanced beyond this comparatively simple procedure. Excision then affords the only procedure capable of affording some chance of recovery. It is now advocated by most experienced laryngologists when the limits of the thyroid cartilage are not passed; that is to say, when only the tissues *within* the larynx proper are involved and when there is no glandular enlargement. Local

applications of acids, cautery, arsenic, etc., but stimulate the development, and are therefore more hurtful than beneficial.

Literature of '97-'98-'99.

Forty-five cases of malignant disease of the larynx have been personally operated upon. Of the last 26 cases, 23 recovered. Gluck (*Ther. der Gegenwart*, H. 4 and 5, '99).

Fifteen cases of carcinoma of the larynx have been treated by Professor Kocher since 1890. Twelve of these were operable. The first 7 of the series were operated upon by Kocher's former method; *i.e.*, general anæsthesia, tampon-cannula, total or unilateral extirpation of the larynx by means of the so-called T-incision, and subsequent feeding with pharyngeal tubes.

In the later cases of the series, in place of general anæsthesia, local anæsthesia by the infiltration method of a 1-to-100 solution of cocaine was employed. The patient was placed in the Trendelenburg position and the use of the cannula dispensed with. A median incision was made from the hyoid bone over the larynx, exposing the thyroid cartilage. The thyrocricoid ligament was perforated and the thyroid cartilage split vertically with scissors.

The halves of the cartilage were retracted, thus completely exposing the interior of the larynx and the tumor. The parts to be removed were anæsthetized by penciling them with a 1-per-cent. solution of equal parts of cocaine and antipyrine, and the tumor excised widely with the knife, or better with the thermocautery. If possible, only the soft parts were thus excised, but in cases in which the cartilage was involved the scissors were used to remove the affected cartilage subperichondrially. The bleeding surface was cauterized and powdered with iodoform, and an ordinary tracheal cannula introduced. The wound was tamponed and left open. Special position of the body, as well as feeding by the tube, is not necessary.

Of the 12 cases operated upon, 1 died as a result of the operation; 2 are con-

sidered cured, one four years and a half, the other two years and a half after the operation; 3 are free from recurrence, but have not been observed for a sufficient length of time to consider them definitely cured.

These good results would not have been possible had not the diagnosis been made early in the majority of the cases. F. Butsch (Deut. Zeit. f. Chir., B. 1, p. 481, '99).

To assuage the sufferings of the patient, much can be done. The insufflation of orthoform or the local application of a cocaine solution before meals to the ulcerating tissues enables the patient to swallow his food. When he can no longer do this, a stomach-tube or a large rubber catheter may be introduced alongside the growth, into the pyriform sinus, and the patient fed through it with nourishing liquids: milk and cream, soft-boiled eggs, broths, etc.

Tracheotomy, early in the case, when laryngectomy cannot be performed, by giving rest to the larynx seems to stay the progress of the growth. It should be performed low down and under strict antiseptic precautions.

SARCOMA.—Sarcoma, according to Gurlt's statistics as quoted by Bosworth, occurs once in the larynx in every eight hundred and forty-eight cases of this form of tumor met with, while general average of the cases reported by various observers would place the relative number of cases of laryngeal sarcoma as compared to laryngeal carcinoma at 1 in 23.

As is the case with carcinoma, it may occur in any part of the larynx, but with a predilection for the vocal cords. The yellow color of sarcoma as compared to carcinoma, which is usually reddish at the start, the globular or rounded surface as compared to the ulcerative process observed early in the latter, and slower growth are important features, but the

diagnosis should invariably be verified microscopically. The subjective symptoms are not usually as severe; indeed, the patient may otherwise be in excellent health as witnessed in case seen myself, and to all intents and purposes the case may simulate in this particular a benign tumor.

Treatment.—Early extirpation of the growth affords a far better prognosis than when carcinoma is present, since glandular involvement occurs later. When the tumor has involved the greater part of the larynx, laryngectomy should be resorted to.

Tumors of the Lung.

Benign tumors of the lung are, as a rule, of but little clinical importance. Being usually small, they involve but limited areas of pulmonary tissue, and, therefore, give rise to no special discomfort, especially when their development is insidious. *Lipomata*, *chondromata*, *osteomata*, and *adenomata* are the varieties usually found at autopsies.

Malignant growths, on the contrary, are comparatively common, carcinoma (about 1 in 500 autopsies—Wolf), *sarcoma*, and *endothelioma* being observed. A single lung is usually attacked, but the other may become involved through metastasis, if the patient's life is sufficiently prolonged. Both lung and pleura are involved conjointly in some cases, the line of demarkation between the two structures being lost.

Malignant Tumors of the Lung.—**CARCINOMA.**—Two groups of primary carcinoma of the lung are recognized clinically by Pässler (Virchow's Archiv, B. 145, '96), the division being based upon the anatomical location of the growth. The first group comprises the cases in which the growth is situated along the course of the bronchi at some distance from the root of the lung. These cases

often run a course for a long time resembling that of chronic tuberculosis. Later on there usually occur complications in the form of bronchiectasis, pneumonia, and gangrenous processes.

The second group of cases comprises those in which the carcinoma develops at the root of the lung. In these the symptom-complex is much like that of the mediastinal tumors. Both groups, however, have in common the cachexia, metastasis, cough, and expectoration.

Among the important signs in carcinoma of the lung are consolidation of one lung with increase of the thorax on the affected side, or retraction of the same side; bronchial irritation, cough, and expectoration; pleurisy, with fibrinous, serous, hæmorrhagic, purulent, or putrid exudate; symptoms of pressure upon the nerves or veins, and finally cachexia. The discovery of signs of consolidation of the lung of progressive character, and only a moderate catarrh of the bronchi with scanty expectoration, may lead to suspicion; but hæmorrhagic sputa is more significant. The color and character of the sputum, the "prune-juice" sputum, is usually thought to be characteristic. All that can be said is that the character of the sputum is often hæmorrhagic, while there is no characteristic tint. There may be but little expectoration, and sometimes none at all. It may be gangrenous. Dyspnœa, sometimes accompanied by cyanosis, is a very constant sign.

Repeated dyspnœic attacks, with absence of physical signs sufficient for their explanation, must always be regarded as suspicious. I. Adler (N. Y. Med. Jour., Feb. 15, '96).

When cells are found which plainly differ from the ordinary pavement and cylinder cells of the mouth or air-passages—cells which are non-pigmented, polymorphous, polygonal, of various

sizes, including sometimes giant cells, with plain nucleus and nucleolus, single or in masses—the diagnosis of new growth is permissible (Hampeln, Zeit. f. klin. Med., B. 32, p. 247). The symptoms are sometimes hardly perceptible, not only at the start, but also when the disease has involved a considerable portion of the lung.

Very frequently the earlier stages of the disease are accompanied by no very prominent symptoms. Even the entire course of the malady may be accompanied by symptoms so slight and so indefinite in character that the attention neither of the patient nor of the medical attendant is directed toward the lungs as the seat of disturbance. I. Adler (N. Y. Med. Jour., Feb. 8, '96).

Cancer is also recognized with difficulty when a concomitant affection—tuberculosis, for instance—is present. This has been repeatedly observed. Involvement of the lymphatics is an irregular complication.

When the pleura is the main centre of the lesion, the effusion of fluid into the pleural cavity stands prominent among the clinical symptoms, and dominates the entire clinical aspect. Whenever in such a case the aspirated pleural exudate is sanguinolent, and tuberculosis can be excluded, there is strong ground for suspecting a tumor (Adler). According to Hampeln, a cancerous effusion is distinguished by its tendency to repeatedly recur after aspiration.

The diagnosis is easier in a case of lung carcinoma, especially when the tumor is situated near the pleura, than in a case of bronchial carcinoma. In the former instance a circumscribed dullness in conjunction with great wasting, and catarrhal sputum free of bacilli, but occasionally bloody, may suggest the affection. Pain is occasionally present, but naturally dyspnœic symptoms are more common to bronchial carcinoma than to lung carcinoma. Implication of

the bronchial glands often manifests itself by dyspnoea or recurrent paralysis. Metastasis is more apt to occur with bronchial than with the proper lung carcinoma. The presence in the sputum of particles of the tumor is rare, as it was observed in only one of thirty-one cases. Wolf (*Fortschritte der Med.*; *Med. Record*, May 16, '96).

Literature of '97-'98-'99.

The Roentgen rays may enable a diagnosis of lung tumor to be made at a time when percussion can detect no abnormality. Leo (*Berl. klin. Woch.*, Apr. 18, '98).

Through stenosis of the bronchi involved in the cancerous areas, areas totally devoid of air not only elicit dullness on percussion, irregularly distributed, but the respiratory and vocal resonance are correspondingly modified.

SARCOMA.—The clinical signs of sarcoma do not vary to a great extent from those of carcinoma, though, on the whole, they appear to present a greater degree of variation.

Schwalbe is of opinion that a rather intense stridorous respiration speaks more for sarcoma, inasmuch as the latter tends to more bulky enlargement of the lymph-glands, and, therefore, to an earlier and closer bronchostenosis than carcinoma. The earlier years of life incline more to sarcoma, the senile period more toward carcinoma. I. Adler (*N. Y. Med. Jour.*, Feb. 15, '96).

The principal diagnostic signs, according to Bock, are the peculiarly even distension of that side of the barrel-shaped thorax; the stretched, but not bulging, intercostal spaces; the passive dilatation of the superficial veins of the affected side; the greater resistance felt by the finger on percussion; and the total absence of respiratory sounds of the affected side. These cases occasionally run a rapid course.

Etiology.—In 31 cases of primary carcinoma of the lungs occurring in over

7000 autopsies analyzed by Wolf (*Fortschritte d. Med.*, Nos. 18 and 19, '95), 27 of the patients were men and 4 were women. The right lung was affected 5 times, the left lung 3 times; the right bronchus 13 times, the left bronchus 8 times; both bronchi were involved twice. In 13 of these cases tuberculosis was a complicating condition. Metastasis was more likely to occur when the primary tumor affected the bronchi than when it affected the lung.

The middle and late years of life, as in carcinoma elsewhere, offer the greatest number of cases, while sarcoma occurs early in life, sometimes during infancy.

Workers in cobalt mines offer a predilection to primary pulmonary cancer, a large proportion of them dying of this disease.

Pathology.—I. Adler recognizes four general forms of carcinoma: the cylindrical-celled, the pavement-celled, the medullary, and scirrhous forms, the cancers originating in the bronchial mucous membrane-being generally composed of cylindrical cells. True pavement-epithelium-cell epithelioma has been observed by Ehrlich, while Grünwald, Fuchs, and Wolf have found the epithelium of the alveoli to be the starting-point for cylindrical-cell and pavement-cell cancers. The neoplasm may be diffuse, or occupy restricted areas in the form of nodular masses, which may be numerous, or restricted in number. The diffuse variety starts from a bronchial focus and proliferates into the peribronchial and perivascular lymph-spaces in all directions. The nodular form may involve the greater portion of a lobe, completely transforming its structure. They show, according to Adler, a distinct tendency to softening and degeneration.

Primary epithelial carcinoma of the lung may arise (1) from the alveolar epithelium; (2) from the epithelium of

the bronchial mucous membrane; (3) from that of the bronchial glands. Primary endothelial carcinoma may arise (a) from the endothelium of the superficial lymphatic vessels of the pleura, and (b) from the pulmonary lymphatics. Siegert (*Virchow's Archiv*, B. 134, H. 2, '94).

Treatment.—Pneumonectomy, according to Réclus, is permissible in exceptional cases and when a neoplasm extends from the thoracic wall to the lung. Abstinence is preferable, however, in primary cancer, since, on the whole, the results have been disappointing through the fact that the growth had involved the tissues extensively before a diagnosis had been established with sufficient certainty to warrant an operation. Aspiration when the pleura is the seat of the neoplasm sometimes relieves the sufferings of the patient, though the infiltration usually recurs repeatedly.

Solid tumors should be extirpated when superficial, taking advantage of adhesions when any exist and establishing adhesions when those present are not of sufficient extent. Péan (*La Presse Méd.*, Oct. 23, '95).

CHARLES E. DE M. SAJOUS,
Philadelphia.

TUMORS OF THE RECTUM AND ANUS.

Benign Tumors.

The benign tumors are usually divided into the (a) adenoma, (b) fibroma, (c) papilloma, (d) lipoma, (e) teratoma, (f) enchondroma, (g) angioma, and (h) cystoma.

ADENOMATA, OR SOFT POLYPI, are probably the most frequent form of the benign neoplasms met with in the rectum. They occur with the same relative frequency in both of the sexes and especially between the ages of three and twelve. They vary in size from that of a small pea to that of a large chestnut, although

cases are on record in which the tumor has been considerably larger. Their shape is more or less globular or pyriform. The surface is usually lobulated and nutmeg-like. It is attached to the rectal wall by a narrow, but often elongated, pedicle. Arterial pulsation can frequently be felt within the pedicle, as it is through this stem that the blood-supply of the growth is furnished. The vessels conveying the same are often of fair size. This fact is of importance, as it may account for the excessive bleeding which occurs in spontaneous detachment of such tumors.

Cooper and Edwards state that these growths closely imitate the normal mucous membrane in structure, though their glands are larger, more abundant, more branched and convoluted, and less irregularly disposed. They also ascribe their greater frequency in the rectum than elsewhere to the fact that this portion of the intestinal tract is more liable to irritation.

FIBROMATA.—These tumors take their origin from the submucous or connective tissue of the bowel, are more or less pedunculated, and vary with regard to their relative firmness. Messrs. Allingham state that all of the very dense fibrous polypi that they have met with have been as large as an English walnut; that they creak when cut, and the incised surface is of a pale color. Such growths they consider quite exceptional specimens of this form of tumor. The small polypi so frequently seen in connection with fissure and with hæmorrhoids are due to an hypertrophy of the upper extremities of the columns of Morgagni. Unstriped muscular tissue is sometimes found intermixed with the fibrous tissue of these growths, and, according to Cooper and Edwards, it may form the greater portion of the tumor. Usually these tumors are

single, but occasionally they are multiple, and, in rarer instances, disseminated over quite an extensive area of the bowel. The surface of these growths is usually smooth, and they are apt to be pear-shaped.

PAPILLOMATA.—These growths are variously termed by different authorities as “villous tumors of the rectum,” “villous polypus,” and “granular papilloma.” According to Ball, they are a rare form of rectal growth, resembling the villous tumor of the bladder, in general appearances, with the slight difference, however, that the lobes in the growth occurring in the bladder are more filiform, while in the rectum they are flattened or club-shaped. They are composed of the papillæ of the mucous membrane, which have proliferated freely, and are covered with cylindrical-celled epithelium. Papillomata are attached to the wall of the bowel by a more or less broad pedicle, but they are occasionally sessile. They bleed freely and occasion more or less mucoid discharge. They may protrude from the anus.

LIPOMA.—Tumors composed of adipose tissue have also been observed in the rectum.

TERATOMATA, OR DERMOID CYSTS, are very seldom found in this situation. They differ in no respect from the same growth as found elsewhere in the system.

ENCHONDROMATA, OR CARTILAGINOUS GROWTHS, are said to occur in the rectum, but they must be extremely rare.

ANGIOMA.—These nævoid tumors are likewise of rare occurrence in the rectum, and when they exist may occasion considerable hæmorrhage.

CYSTOMA.—Various cystic tumors may occur about or within the rectum, but dermoid cyst is the most authenticated variety found in this locality.

Symptoms.—There are no marked symptoms to be defined as peculiar to benign growths. A sensation of weight in the rectum may be experienced; shooting pains, distress in the loins or back, more or less tenesmus, and diarrhœa, with more or less discharge of mucus and of blood, are often noted. The character and intensity of the symptoms are influenced by the size and position of the growth. If situated high in the rectum, but little, if any, inconvenience may be experienced. When, however, it is attached low in the bowel, the local discomfort is complained of.

The differential diagnosis of the varieties of rectal tumors has already been sufficiently dwelt upon. Piles are not pedunculated, and a prolapse should occasion no difficulty in diagnosis. In cases of polypoid growth an enema should be administered and the entire rectum examined by first passing the examining finger as high as possible into it, then sweeping the palmar surface around the mucous membrane from above downward. In this manner the polypus may be caught between the finger and the rectal wall if present. Otherwise the growth would escape detection by being pushed ahead of the examiner's finger.

Tumors of the rectum, especially when situated some distance up, may occasion intussusception and even prolapse of the bowel. Partial and even complete obstruction of the gut may likewise be caused. Ulceration and extensive bleeding may also be produced.

Treatment.—The treatment of these tumors is essentially surgical. Prompt removal is the only safe advice to give, the actual cautery or the ligature being employed. Anæsthesia may be required in some forms of this trouble before operative interference may be carried out. Small polypi may, with comparative

safety, be twisted off with a pair of hæmostatic forceps.

Malignant Growths of the Rectum.

The rectum is one of the favorite sites for malignant growths. In this region, as elsewhere, cancer is viewed as an incurable affection, and is asserted to run its course in about two years. It usually occurs after middle life, though cases are recorded in which it attacked the very young, and, though believed to be more frequent among females, Messrs. Allingham state that in their experience many more men are victims to this disease, to which statement the limited number of cases seen by me would lend emphasis.

Varieties.—The forms of malignant disease met with in this locality are: (a) epithelioma, (b) scirrhus, (c) various forms of sarcoma, (d) encephaloid, (e) colloid, and (f) melanotic. In those tumors in which much fibrous tissue is mixed with the newly formed glandular structures, the growth is hard and resistant; when the neoplastic tubules are in excess, and the fibrous tissue delicate and scanty, the tumor is soft and fungous, and corresponds with the description of medullary cancer. A gelatinous condition due to mucoid or colloid change affecting the cells has given rise to the term "colloid" as applied to such growths.

The three terms scirrhus, medullary, and colloid, signify varying conditions of a growth or parts of a growth composed essentially of glandular tubules and epithelial cells.

Cooper and Edwards (*op. cit.*, pp. 190-93) subdivide the adenocarcinoma into three forms, which may be severally distinguished as (a) the *laminar*, (b) the *tuberous*, and (c) the *annular*. Their description of these varieties is as follows:—

"In the *laminar* form, which is the most common, a portion of the intestinal wall is infiltrated or thickened, the affected area varying in size according to the stage of the disease. The thickening appears to exist between the muscular and mucous coats, and it tends to spread laterally rather than either upward or downward. Its centre is slightly raised, while the edges are beveled off. The growth is connected with and binds together all the tissues of the bowel, but at first is freely movable as a whole. After awhile the surface of the neoplasm gives way, leaving a ragged ulcer with characteristically infiltrated borders. The destruction generally begins near the centre and extends toward the circumference; but sometimes ulcers form at several points on the surface. As the process advances, the infiltration is gradually eaten away; its remains may be recognized as nodules or papillary excrescences rising from the base or border of the ulcer. In later stages the base may be smooth, hard, and clean, being formed by cicatricial tissue and the remains of the muscular coat, while the edges are hard and raised, and either tolerably uniform or beset with nodular or papillary growths. Much connective tissue is developed beneath the base of the ulcer, and becomes constricted and puckered, as these changes are in progress. The course of the growth is sometimes different, inasmuch as the deposit is only partially destroyed by the ulceration, and its remains sprout up and form tumors projecting into the cavity of the bowel. The ulceration sometimes has another result, viz.: destruction of the coats of the bowel and perforation of adjoining viscera.

"In the *tuberous* form the growth projects into the bowel. Its consistence varies, being sometimes hard and firm

and in other instances soft and fungoid. One such mass may be present; or there may be several growths of the same character, but varying in size. At first the mucous membrane, though firmly adherent to the tumor, remains intact, but is soon destroyed by ulceration, and a portion of the growth is then apt to project through the opening thus made. Sometimes the membrane gives way at several spots, at which nodules or larger portions protrude. Such outgrowths are soft and friable. Sometimes the destructive process is too rapid for the development of fungoid growths; when the surface gives way, the ulceration continues to extend deeply and superficially until the muscular coat is laid bare. The cancerous process invades the neighboring tissues and structures,—*e.g.*, bladder, urethra, or vagina,—and openings are made into these parts. The process again may extend toward the sacrum and involve the nerves and bones of the pelvis. Occlusion of the bowel by a fungoid mass is a less frequent result.

“In the *annular* form the growth begins as a deposit between the mucous and muscular coats, and extends laterally so as to involve the whole circumference of the bowel, but does not spread upward to any great extent. The subsequent contraction diminishes the calibre of the bowel and causes a marked degree of stricture.”

Symptoms.—The early symptoms of cancer of the rectum are far from being characteristic. Indeed, it often exists for a considerable period before the patient is cognizant of any trouble. Frequently patients consult a surgeon about hæmorrhoids or some minor affection of the rectum or anus, and it is only after a digital examination that the presence of cancer is recognized. Generally, the first sign experienced, in cases of this disease,

is a sensation of uneasiness in the lower part of the back and along the inner sides of the thighs, with possibly a similar feeling within the rectum. At the end of a day's work this may be supplanted by actual pain, of a dull, heavy character. The next and most usual symptom is morning diarrhœa. As soon as the patient gets out of bed, or soon thereafter, he is obliged to go to the closet. He may or may not pass any fecal matter, but does pass a thin sanious discharge, having a most characteristic odor. Later the bowels move several times during the morning and most of the stools consist of this sanious discharge. The color of the stools is such that most patients ascribe their trouble to piles, and the discharge is attributed to blood from the latter. Constipation may alternate with the attacks of diarrhœa.

Pain is nearly always a very late symptom of cancer of the bowel; this depends, however, upon the rapidity of the growth of the neoplasm. As soon as the growth invades the anal portion, or neighboring organs or involves the sacral nerves, pain becomes a marked factor. Obstruction of the bowel and the straining efforts at defecation will tend to increase the pain.

The discharge varies in quantity in different cases and at various stages of the development of the growth. In the early stages the blood is probably brighter in color and is derived from the congested vessels in the neighborhood of the tumor, but later on the hæmorrhage is due to ulceration and erosion, as well as to congestion. In some cases the constitutional effects are most marked. In nearly all cases there is loss of flesh and strength. Sometimes the cancerous cachexia is not sufficiently marked as to be very noticeable. In the late stages the liver is often enlarged. The lumbar and pelvic glands

are usually involved, although this condition may not be so marked as to be readily distinguishable.

The duration of the symptoms varies in different cases and depends, to some extent, upon the age of the patient and the character of the neoplasm. In the young the disease generally runs its course quite rapidly, and when the growth is soft its effects are more rapid.

Diagnosis.—There are two conditions which are likely to be confounded with malignant disease of the rectum, one being benign growths and the other neoplasms external to the bowel.

BENIGN GROWTHS are generally pedunculated; cancers rarely so; benign growths, unless ulcerated, are bathed in healthy, transparent mucus; cancers discharge offensive, chocolate-colored matter, the odor of the same being almost pathognomonic of malignant disease. Benign tumors are not friable, like malignant growths, nor do they bleed as easily. Benign neoplasms spring from a soft, healthy mucous membrane, which glides freely upon the deeper coats of the bowel, while the malignant tumor grows from an indurated lump or patch in the bowel, which seems fixed or rigid. In suspected tumors, in which the diagnosis is at all obscured, a small specimen of the same may be obtained by scraping the tumor either with the finger-nail or a curette, and subjecting the excised portions to a microscopical examination (Andrews, *op. cit.*, pp. 112-13).

Prognosis.—The duration of the symptoms will prove of value in reaching a conclusion; the onset and progress of benign neoplasms being extremely slow. In malignant disease there is usually a portion of tolerably healthy mucous membrane between the growth and the anus, whereas in the non-malignant stricture this portion of the bowel is

generally more or less infiltrated (Harrison Cripps, *op. cit.*, p. 383).

Etiology.—The causes of this disease are not known, and even its pathology is subject to dispute. The question of heredity is an open one, and probably if it be a factor it is one of only slight importance. Climate, as noted by the Messrs. Andrews, influences the tendency to cancer. These authorities state that it is clear that in this country cancer prevails most near the sea, and least of all at a distance from it; also, that, at equal distances from the sea, it abounds decidedly more at the North than at the South. The germ theory, as applied to the origin of this disease, has some ardent advocates, but so far success in proving this to be more than a theory has not crowned the efforts of the microscopists.

Treatment.—The surgical treatment of this disease will first engage our attention because it is to such procedures that we must look to for the most relief. If it were possible to recognize the existence of cancer at its earliest stages and to obtain consent for its radical removal, the prognosis of such operations would be greatly bettered and the statistics would show, at least, a remarkable prolongation of life. Great relief from its most distressing symptoms would also be afforded.

It is frequently a hard matter to decide which of the surgical procedures is to be resorted to, the aim being to afford the greatest relief with the incurrence of the minimum risk. The recognized procedures are four in number: *extirpation*; *colostomy*, inguinal and lumbar; *posterior linear proctotomy*; and *curettage*.

EXTIRPATION.—The ideal method of treating cancer of the rectum would be by extirpation, as is done in cases of the same disease when the mammary gland is the site affected; but unfortunately it

is not often that the rectal neoplasm is discovered in time to permit the entire removal of the growth and of all glandular involvement; consequently, it is my belief that the cases in which this operation is indicated will be confined to a relatively small number of cases.

Kraske, of Freiburg, recommends a radical operation for the excision of the rectum. Up to 1897 (*Sammlung klin. Vort.*, 183-184, '97) he had operated upon 80 cases, 15 of which died. The 80 cases divided into two series, the first of which occupies five years, during which writer was perfecting the operation; it comprises 29 cases with 10 deaths, giving a mortality of 34.5 per cent. The second series, extending over the last 7 years, includes 51 cases with only 5 deaths, being a mortality of 9.8 per cent.

The operation is as follows: The patient being placed on his left side, an incision is made starting from the second piece of the sacrum and extending down to the anus, in the middle line. The soft tissues are then carefully raised from the sacrum, the coccyx is excised, and the sacro-sciatic ligaments are severed at the sacrum. The rectum is thus brought into the field of operation. If it is necessary to increase the field a portion of the left side of the sacrum opposite the third sacral foramen may be removed. Kraske does not favor sacral section above this level, nor does he recognize the utility of a temporary or osteoplastic resection, which some advocate with a view to prevent prolapse of the pelvic organs, owing to a presumed weakening of the floor of the pelvis. The resection of the cancer is begun by him with the division of the bowel below the tumor by opening it transversely; sutures are then placed in the upper cut surface for traction purposes. The patient is then brought into the lithotomy position, and the dissec-

tion proceeded with. Sometimes the peritoneum can be peeled off the bowel; but, if necessary, it must be opened, two fingers introduced, the gut pulled down, and the operation proceeded with. Packing of the wound with iodoform gauze should be adopted to prevent infection, and need not be removed till it shows a tendency to become loose, about the end of the first week.

Literature of '97-'98-'99.

Seventeen cases of amputation of the rectum by Kraske's method: 3 of the patients died, giving a mortality of 17.07 per cent. Of the 14 cases traced, 6 have now passed beyond the three-year limit and may be considered reasonably safe from recurrence. Two of the men, in spite of the loss of the coccyx and part of the sacrum, ride bicycles with ease. W. W. Keen (*Jour. Amer. Med. Assoc.*, Aug. 13, '98).

J. M. Mathews (*N. C. Med. Jour.*, Apr. 20, '98) states that unless all tissues involved in the cancerous disease can be removed, an operation is useless. The rectum is contiguous to a large distribution of glands and lymphatics. Cancer situated above and not involving the sphincter-muscle is often an insidious disease. When the mass has so far extended as to embrace the whole rectum, it is safe to infer that the infiltrative process has so extended that it has embraced structures which cannot be removed; hence to resect simply the mass in sight would avail nothing. If, on the contrary, the growth can be circumscribed, and the assurance had that all diseased structures can be removed, then resection, or rather extirpation, should be advised. Operation is much more preferable than to perform a colostomy in such a case. The latter can only be a palliative, if that; while the former anticipates a radical cure. Mathews avoids such operations as Kraske's if a

lesser one will accomplish the purpose. Removing portions of the rectum by the simple circular incision and a careful dissection of the gut with the fingers has been practiced by him.

Among the advantages of the vaginal method of extirpation of the rectum are the following: The vagina can be made to take the place of the extirpated portion of the rectum. The excision can be done as high up as by the sacral method and with less traumatism, and, in case the peritoneal cavity is opened, with less danger. An intraperitoneal exploration of the tissues about the rectum can be made before disturbing the rectum. If the operation has to be abandoned after the incisions are made, the wound is less formidable and in a better place. The patient is more comfortable after the operation than after the sacral methods. Price's abdominal method possesses nearly all of these advantages, but is more dangerous, necessitates a removal of the uterus, and cannot be adapted to cases extending low down in the rectum. McArthur's method is more dangerous in cases high enough up to involve an opening into the peritoneal cavity, and in all cases involves more traumatism. Byford (*Annals of Surg.*, Nov., '96).

Literature of '97-'98-'99.

In rectal cancer metastases occur late. Even if in operating some glands which are infected are left behind, the progress of the disease in these limited areas may be extremely slow. There are numerous examples on record of prolonged life after rectal excision, and many cases have been recorded of non-recurrence for six, eight, and ten years. The mortality of rectal excision by sacral operation varies from 20 per cent. to 25 per cent. Czerny's mortality was 5.4 per cent. by the perineal route, 19.4 per cent. by the sacral route; Iversen, 25 per cent.; Albert, 18 per cent.; Ball, 8 per cent.; and Paul, 14 per cent. E. H. Taylor (*Annals of Surg.*, Apr., '97).

COLOSTOMY.—Colostomy is quite practicable in a large number of instances, and the benefits derived from its per-

formance are thus minutely described by Charles B. Kelsey (*N. Y. Med. Jour.*, Nov., '92): "It relieves pain: does away with the constant tenesmus and discharge from the rectum, which by their exhausting effects are the immediate cause of death; delays the development of the disease by preventing the straining and congestion of defecation; prevents absolutely the complication of intestinal obstruction, which is another cause of death; enables the patient to sleep, eat, and gain flesh, and often makes him think himself cured in spite of the plainest prognosis to the contrary. Instead of his passing his days and nights upon the commode, wearing out his life in his efforts to free the bowel from its irritation, he has one or perhaps two solid fecal evacuations from the groin in twenty-four hours." The benefits to be derived from colostomy are not exaggerated. It is the operative procedure indicated when a cancer has reached the stage of operative interference and has passed beyond the time when the surgeon reasonably expects an extirpation to afford a radical cure.

During the last eight years, 720 cases of cancer of the rectum seen, and excision performed 62 and colostomy 138 times. If the patient is not over 45 years of age, excision offers very little prospect of permanent success. Allingham (*Lancet*, Apr. 25, '96).

POSTERIOR LINEAR PROCTOTOMY.—I have never attempted to relieve a patient suffering from malignant trouble by means of this operation. In benign structures I have found the procedure a most excellent plan of treatment when combined with the subsequent use of bougies. Those surgeons who adopt this method for the relief of cancer speak highly of its efficiency, some going so far as to claim that it takes the place of both colostomy and excision.

CURETTAGE.—In those cases in which the growth is within the lower three inches of the rectum and its character is such that extirpation is not possible and colostomy is not at the time necessary and the growth not hard, considerable temporary benefit may be given the patient by resorting to this operation. In selected cases it is followed by a diminution of pain, bearing-down sensations, and discharge, and the lumen of the bowel is enlarged.

In certain cases the combined operations of colostomy and of curettage will afford the patient much more relief than where one or the other procedure is individually adopted. It is true that only temporary relief is afforded by either of these operations, but in the majority of cases this is all we can offer the patient under any plan of treatment in vogue at the present time.

The *medical treatment* of cancer of the rectum presents but three points for consideration: the daily evacuation of the bowels, the use of some soothing local antiseptic wash to cleanse the parts, and the relief of pain and tenesmus. The first indication may be met by the employment of salines: citrate of magnesia, Epsom salt, or phosphate of sodium. The second by enemata of a 2-per-cent. solution of creolin, or the same strength solution of permanganate of potassium. The third indication for a time may be overcome by the use of iodoform suppositories (10 grains of the drug in each suppository used, if necessary, every six hours). The use of opium should be avoided as long as possible. The denarcotized tincture of opium is the best preparation to employ.

LEWIS H. ADLER,
Philadelphia.

TURPENTINE.—Turpentine (crude, or white, turpentine; common frankin-

cense; terebinthina, U. S. P.) is a concrete oleoresin obtained from *Pinus palustris* and from other specimens of *Pinus* (nat. ord., *Coniferae*). From this crude turpentine a volatile oil may be distilled officially known as oleum terebinthinæ (U. S. P.), from which are prepared linimentum terebinthinæ (U. S. P.) and oleum terebinthinæ rectificatum (U. S. P.). Turpentine-oil is a solvent for wax, iodine, sulphur, phosphorus, and the fixed oils. Rectified turpentine is obtained by redistilling the oil of turpentine. It is alone suited for internal uses. When the oil of turpentine is distilled off from turpentine a resin (rosin) is left which is official (resina, U. S. P.) and from which are prepared ceratum resinæ (U. S. P.) and emplastrum resinæ (U. S. P.).

TEREBINTHINA CANADENSIS, U. S. P. (Canada turpentine; Canada balsam; balsam of fir) is the natural oleoresin from the balm-of-Gilead fir (*Abies balsamea*). It occurs as a yellowish, transparent, viscid liquid having an agreeable, pine-like odor and a bitter taste, and soluble in ether, chloroform, benzin, xylol, turpentine, oils, etc.

TEREBENE (terebenum, U. S. P.) is obtained by subjecting oil of turpentine to the action of sulphuric acid and distilling at a temperature of 160° F. It occurs as a clear, colorless, or slightly yellowish, mobile liquid, having a fresh-pine odor and a pungent taste, freely soluble in water, ether, glacial acetic acid, and carbon disulphide.

TERPIN HYDRATE (terpini hydras, U. S. P.; dipentene-glycol) is the hydrate of the distomic alcohol terpin. It occurs in colorless, lustrous, rhombic prisms, having a slightly-bitter taste, and soluble in benzene (benzol), in 10 parts of cold and in 2 parts of boiling alcohol, in 100 parts of ether, in 200 parts of chloroform,

in 250 parts of cold and in 32 parts of boiling water, in equal parts of glacial acetic acid, and in carbon disulphide.

Preparations and Doses.—Terebinthina (U. S. P.), 5 to 30 minims.

Terebinthina Canadensis (U. S. P.), 5 to 30 minims.

Linimentum terebinthinæ, U. S. P. (resin cerati, 65 parts; oil of turpentine, 35 parts). Used externally.

Oleum terebinthinæ (U. S. P.), 5 to 30 minims (as anthelmintic, $\frac{1}{2}$ ounce).

Terebenum (U. S. P.), 3 to 15 minims.

Terpini hydras (U. S. P.), 2 to 10 grains.

Physiological Action.—The oil of turpentine, taken internally in moderate doses, gives rise to a sensation of warmth in the stomach. The circulation is quickened and the warmth of the skin is increased; no cerebral stimulation appears, although vertigo and intoxication may come on if the dose be large enough. Small doses frequently repeated stimulate the kidneys; if long continued, irritation of the genito-urinary tract ensues which may result in strangury. The urine acquires the odor of violets, and may contain blood. Turpentine is excreted by the lungs and the kidneys, even when taken by inhalation. An erythematous eruption occasionally appears after the ingestion of turpentine. The coagulability of the blood is increased by the administration of this drug.

Poisoning by Turpentine.—Although turpentine is capable of producing death, cases of serious poisoning by it are rare, and a fatal case is exceedingly so. Most of the symptoms are constant, except vomiting and purging, which are present in some cases and not in others. There is generally complete unconsciousness, which is occasionally accompanied by dilated pupils; the urine, often bloody, is very much lessened in quantity and

frequently suppressed; the skin is sometimes dry, sometimes moist; the pulse is feeble, rapid, and generally regular. The lethal dose is not definitely known, but must be very large. Toxic doses of turpentine paralyze the sensory nervous system, either in the cord or in the peripheral nerves, and death results from respiratory paralysis.

The treatment of poisoning by turpentine consists in the evacuation of the stomach and bowels by liberal doses of magnesium sulphate, the administration of demulcent drinks to soothe the irritated mucous membrane of the alimentary canal, and the exhibition of morphine in sufficient doses to control peristalsis, cystic spasm, and pain.

Therapeutics.—Turpentine is a valuable local application for the purpose of producing counter-irritation over the surface when deep-seated inflammation exists. For this purpose it may be used in the form of a stupe, or diluted with equal parts of olive-oil or cotton-seed oil.

Turpentine is used internally as a diffusible stimulant in exhausting fevers, especially if flatulence or ulceration be present.

In typhoid fever it is useful to overcome tympanites administered internally or as stupe or enema. It is also valuable in the same disease toward the end of the second week when the tongue is red, cracked, and brown, the teeth covered with sordes, and well marked tympany is present, 5 to 10 drops given in emulsion three times a day being usually sufficient. It is again useful during the stage of convalescence from typhoid, when persistent diarrhoea and constant relapses result from an unhealed condition of Peyer's patches.

Turpentine is often of service in intestinal and other passive hæmorrhages, such as hæmaturia and menorrhagia.

Literature of '97-'98-'99.

Turpentine is useful as an hæmostatic and also as a stimulant alternative in subacute and chronic catarrh of the gastro-intestinal system. In hæmatemesis from chronic alcoholism or chronic venous engorgement from other causes it is more efficient than the astringents. The best method of administration is in suspension. Two to 10 drops of turpentine may be stirred into an ounce or two of water, well sweetened with the saccharum anisi of the German Pharmacopœia. Where the stomach is non-retentive, small doses every two hours may be given. In catarrhs of the respiratory system after the subsidence of acute symptoms, where a free secretion is present, or where the catarrh persists with or without localized subcrepitant râles, its value is exceptional. In more chronic cases it is often equally efficacious and less objectionable than guaiacol or creasote. It is invaluable also in the bronchial catarrhs of the aged and the infirm. In the catarrhal conditions of phthisis, especially when bronchorrhœa is present, it is equal, if not superior, to guaiacol and creasote, while in the hæmorrhages of phthisis it should hold first rank. In hæmaturia, as in other mucous hæmorrhages, it has a great hæmostatic virtue. In metrorrhagia without tumor or other palpable cause it is of great service. J. B. Walker (Ther. Gaz., July 15, '97).

Turpentine is an efficient, though somewhat dangerous, remedy against tape-worm in the dose of $\frac{1}{2}$ to 1 ounce mixed with an equal quantity of castor-oil.

In chronic and well-advanced renal disease, turpentine may be used when very large doses of powerful diuretics are required to excite the secretion of urine.

A dose of 20 drops is said to be useful in lumbago.

The vapor of turpentine when inhaled from boiling water is valuable in bronchitis. In gleet it is sometimes used to stimulate the genito-urinary tract. Tur-

pentine is an efficient remedy in some cases of purpura hæmorrhagica.

Turpentine is contra-indicated in any acute inflammation of the gastro-intestinal tract and in acute nephritis.

TYPHOID FEVER.

Definition.—Typhoid fever is an acute contagious self-limited disease, which is characterized by inflammation and ulceration of Peyer's patches and the solitary glands of the small and large intestine. Although these lesions are present in such a large number of cases that the term "enteric fever" has been widely used in designating the disease, it must be remembered that fatal cases occur in which the intestines are quite normal and the lesions are found in other parts of the body.

Varieties.—1. The *abortive* form, in which the temperature, after eight or ten days, falls to normal. The hyperplasia of Peyer's patches is not followed by necrosis and ulceration, but resolution takes place at once.

2. The *mild* type, in which the temperature reaches its maximum by the end of the second and becomes normal during the third week. The disease runs an uncomplicated course and the abdominal symptoms are not severe.

3. The *severe* form, in which the patient during the second or third week passes into a low adynamic condition.

4. The *hæmorrhagic* form, in which there is a tendency to extravasation of blood in different parts of the body.

5. The *renal* and (6) the *pneumonic* varieties, in which the kidney and lungs are early and extensively diseased.

7. The *ambulatory* cases in which the patient continues to go about notwithstanding the presence of the disease.

8. The typhoid fever of *children*, in which the temperature-curve does not

present the gradual rise and fall of typical cases, the abdominal symptoms are not so marked as in the disease of adults, and in which bronchitis and nervous symptoms are especially prominent.

9. The typhoid fever of *old age*, in which the disease runs a severe and often fatal course and in which pneumonia is a frequent complication.

10. The typhoid fever of *pregnancy*, which usually occurs in the first four months and frequently produces abortion or premature delivery.

Symptoms.—The stage of incubation varies much in duration, and is generally considered to be two or three weeks. It is sometimes much shorter. Wilson mentions a case in which the disease appeared four days after exposure.

The onset is, as a general rule, slow and gradual. The patient complains of a general feeling of weariness, of loss of appetite, slight nausea, and sometimes of diarrhoea, which is increased by mild cathartics. Headaches, usually frontal, which become more intense toward evening, as well as pains in the back and limbs, are frequently experienced. Chills, more or less severe, are often present and they are sometimes followed by sweats. The countenance is dull, there is slight nose-bleeding, and the tongue is coated with a white fur. The symptoms come on so gradually in many cases that the patient does not consult a physician until the disease is well established, and the temperature is found as high as 102° or 103° . On the other hand, the onset is sometimes sudden and the temperature rises rapidly.

In some cases the headache is so severe and continuous that the case is mistaken for one of meningitis. The pain causes the greatest suffering and distress, and anodynes require to be administered for its relief. Pain in the back of the

neck is occasionally severe and accompanied by local tenderness. This leads to the diagnosis of cerebro-spinal meningitis. The differentiation sometimes cannot be easily made for the first few days. In rare cases lethargy is a very pronounced symptom.

Delirium is sometimes a marked symptom at the onset. A patient once came to my consulting-room for the first time when in a state of delirium.

In cases of pneumonic typhoid the onset may be very similar to that of a pneumonia, and the typhoid character of the case may not become manifest until after eight or ten days, when the fever does not terminate by crisis, but continues on in the ordinary course of typhoid.

Bronchitis, especially in children, is sometimes severe at the onset. The continued elevation of temperature will lead the medical attendant to a correct diagnosis. In a few cases the disease begins as an acute nephritis, and the symptoms of the latter may be so severe as to altogether obscure the real disease.

Although, in the great majority of cases, the temperature rises gradually, it may reach 102° or 103° on the second day.

It is difficult to fix definitely the actual period of onset. Flint considered the time when the patient took to bed as the commencement of the disease. This is a good rule. In the general description it is necessary to divide the time into periods of weeks.

First Week.—In a moderately-severe case the patient, after complaining for a few days of the symptoms already mentioned, becomes so weak that he finds his bed the most comfortable place, or more frequently he consults a physician, who, suspecting the nature of the disease, sends him to bed.

The patient may suffer from severe headache, pains in the back of the neck, in the small of the back, and in the extremities. Wakefulness is sometimes a distressing symptom. As a general rule, delirium is absent during the first week. The patient is usually dull and apathetic, but sometimes the intellect is so clear that the attending physician is thrown off his guard. The skin is hot and dry, and, in some cases, an erythematous rash appears, widely spread over the surface of the body.

Toward the end of the week a few rose-colored spots appear, usually over the abdomen, but occasionally on other parts of the body. There are not more than twenty or thirty present in most cases, but occasionally they occur in large numbers over different parts of the body. The patient complains of a slight cough; and, on examination of the chest, a few bronchitic râles are found. The tongue becomes coated with a white fur, which does not extend quite to the margin or tip. Nausea and want of appetite are present, but usually the patient takes fluids without repugnance. In some cases there is decided irritability of the stomach. More or less diarrhœa is usually present, but the opposite condition of constipation may prevail. The spleen becomes enlarged toward the end of the week.

The pulse is increased in frequency, but not in proportion to the temperature. It is soft, compressible, and often di-crotic.

The temperature gradually rises a part of a degree each day. The evening temperature is higher than that of the morning. The general rise continues until the end of the week.

Second Week.—During the second week the symptoms already described increase in severity. The patient loses strength

from day to day until he is no longer able to help himself. Dullness and apathy increase, and deafness becomes more marked. The countenance is flushed and may become expressionless. The headache gradually disappears and delirium supervenes. In severe cases coma vigil, carphologia, and subsultus tendinum may be present at the end of the second week, and death may follow. Successive crops of spots appear on the chest and abdomen. The tongue continues coated, or it may become dry, red, and cracked. The stomach is often less irritable than during the first week. The abdomen becomes tympanitic, and tenderness, with gurgling, is noticed in the right iliac fossa. Diarrhœa, with ochre-colored stools, is present in the majority of cases. Hæmorrhage may occur toward the end of the week. The pulse becomes more rapid and the temperature maintains the elevation of the end of the first week, or may ascend still farther. It presents daily variations. The heart's action becomes more feeble; so that in some cases the first sound is scarcely heard. Symptoms of pulmonary congestion may appear.

Third Week.—In the severe cases the patient's weakness and emaciation become intense and the muscular movements are made with difficulty. Subsultus tendinum may be quite marked. Delirium continues and that peculiar condition of wakefulness, coma vigil, may be pronounced. The emaciation, flushed condition of the cheeks, and the eyes wide open form a very characteristic type of countenance.

Frequent perspirations occur, which are followed by eruption of sudamina. The rose-colored spots continue to appear in successive crops. Diarrhœa is often severe. Hæmorrhage and perforation may occur during this week.

The pulse becomes more rapid and feeble and the first sound of the heart may be scarcely audible. The temperature in the milder forms may gradually fall to normal in the third week, but, in severe cases, it continues as high as during the second week, presenting, often, marked remissions.

Fourth Week.—During this period, as a general rule, convalescence becomes well established and there is a gradual abatement of the symptoms already described. In severe cases the disease may continue throughout the fourth and even the fifth weeks in the same way as in the third, except that the adynamia and emaciation are increased. The urine and faeces may be passed involuntarily. The pulse becomes more rapid and weak, “the running pulse,” and death takes place from heart-failure, asthenia, hæmorrhage, or perforation. The temperature can be irregular, and may rise from slight causes. Perspirations continue even in the more favorable cases.

The disease may continue through the fifth and sixth weeks.

The Digestive System.—The tongue presents a characteristic appearance. When protruded, tremulousness is observed; and, in the latter stages of severe cases, hesitation; and the patient, apparently from forgetfulness, does not withdraw it. The surface during the first part of the disease is covered with a white fur, thick in the centre and disappearing toward the tip and edges. It is made up of micro-organisms, degenerated epithelial cells, and particles of food. At the end of the second and during the third and fourth weeks the surface may become bare, red, and dry. It sometimes presents a glazed appearance, and is more or less cracked, or it may be covered with a brownish-black coating. This may result from breathing through the mouth,

and is an indication of the severity of the disease. The gums and tongue often bleed, and the accumulation of blood, retained food, and epithelial cells around the teeth and lips form what is known as *sordes*. When convalescence becomes established the tongue gradually assumes its normal appearance, but the coating returns if there is any rise of temperature or impairment of digestion.

The lips become dry, hard, and cracked, and the mouth often contains a sticky mucus. The chewing of hard substances is often impossible, and even drinking is made difficult.

Anorexia and nausea are, as a rule, present, but occasionally the appetite is maintained throughout the whole course of the disease. The stomach will tolerate liquid food except in some cases in which there is great gastric irritability, and this is usually more pronounced during the first week. Sometimes this irritability continues and the patient succumbs for want of sufficient nourishment. Ulceration of the stomach very rarely occurs in typhoid, and perforation from this cause has been reported.

Thirst is a prominent symptom, and liquids will often be taken with avidity when, owing to the mental condition of the patient, they are not asked for.

More or less diarrhoea in some stages of the disease is the rule, but constipation may be present throughout, and this may be the case when extensive ulceration of Peyer's patches is present. Hiccough is sometimes a troublesome symptom, and is often hard to control.

The number of evacuations in the diarrhoeal cases may be from 5 or 6 to 20 or 25 daily. They are copious: liquid, with solid particles (pea-soup character); of a yellow-ochre color, with offensive odor. When allowed to stand, the solid matter settles to the bottom, leaving a

clear fluid on top. The former is composed of undigested food, shreds of mucous membrane, epithelial cells, mucous corpuscles, and crystals of tribasic phosphate.

The bacillus typhosus is not usually found in the intestinal discharges until after the tenth day. About the commencement of the third week these organisms exist in large numbers, and recent investigations have demonstrated the fact that the fæces may contain typhoid bacilli some weeks after convalescence has been established.

Literature of '97-'98-'99.

Typhoid bacilli are present in the stools in the third week of the disease; from this time they rapidly diminish and soon disappear. If a relapse occurs, there is a reappearance of the organism in the stools. Those cases in which the bacilli are found in the stools long after the disappearance of the fever are cases where the bowel discharges were mixed with urine. In about 25 per cent. of all cases the typhoid bacilli are found in the urine. They rarely appear before the third week of the disease, and sometimes persist long after convalescence is established. Therefore the urine is a much more dangerous excretion for the dissemination of typhoid fever than are the stools. P. H. Smith (*Lancet*, May 20, '99).

Sometimes, when there is extreme weakness in the latter stages of the disease, hard masses may form in the rectum of a chalky appearance, the evacuation of which causes great exhaustion. Sometimes assistance is necessary to their removal.

Hæmorrhage from the bowels occurred in from 3 to 5 per cent. of all cases collected by Flint, and in 99 out of 2000 cases observed in Munich. It usually occurs at the end of the second or during the third week. It is a serious, but not necessarily fatal, symptom.

About two-thirds of the cases terminate favorably.

According to Wilson, modern statistics give a mortality of from 30 to 50 per cent. in which the patients die either from exhaustion or from subsequent perforation and peritonitis. In some cases the hæmorrhage is, for a few days, slight in amount, and then the blood may be poured out in large quantities. In others, again, a severe hæmorrhage may come on suddenly and unexpectedly. Sometimes small quantities of blood may be evacuated daily without the occurrence of any great loss. A severe and even fatal hæmorrhage may take place after the disappearance of the fever, apparently from the breaking down of the cicatricial tissue.

The general symptoms of hæmorrhage are fall in temperature, increased rapidity and weakness of the pulse, and a cold and clammy condition of the skin.

In some cases the symptoms are present some time before the blood is evacuated.

In addition to the symptoms already mentioned, delirium ceases and consciousness may be regained after the loss of a large quantity of blood. Faintness and extreme prostration precede a fatal result.

In cases which rally the temperature rises and the symptoms of collapse gradually disappear. A diagnosis of concealed hæmorrhage is made by noting the symptoms already described and by making a careful physical examination of the abdomen. Dullness on percussion, with a feeling of more or less resistance, will be found in some cases over the right iliac region and sometimes extends along the ascending colon. Intestinal hæmorrhage may be part of a general condition, and ulceration into a vessel may have taken place.

Tympanites.—Greater or less swelling of the abdomen from the accumulation of gas is usually present. It does not, as a rule, give rise to grave symptoms. Meteorism arises from two principal causes: the increased fermentation which takes place in the intestinal contents and the paralysis of the muscular coat resulting from toxæmia. The presence of a large quantity of gas depresses the heart's action and favors the occurrence of perforation and hæmorrhage. Meteorism is, no doubt, increased in some cases by the administration of too much food.

Pain is present in a small number of cases. Intestinal ulceration and subsequent peritonitis may give rise to very severe pain. Tenderness on pressure in the right iliac fossa is frequently noticed. It may be most marked near the umbilicus and is occasionally found over the whole surface of the abdomen. The amount of tenderness is apt to be greater in nervous patients. Gurgling from pressure over the right iliac fossa is often present, but is found in many other conditions as well as in typhoid fever.

Perforation and Peritonitis.—The ulceration of Peyer's patches, which usually extends to the muscular coat, is sometimes continued through the peritoneum. An opening is made through which the gas, liquid, and solid contents of the intestine pass out into the peritoneal cavity. The patient is usually seized with sudden and severe pain in the umbilical region, which subsides only after the administration of morphine. Vomiting is a frequent symptom. The abdomen may first be flat and rigid, but soon swelling, with meteorism, supervenes. The temperature usually falls below normal, and the patient becomes collapsed. The breathing is rapid, the pulse feeble and frequent, and there is partial suppression of urine. A pecu-

liar pinched expression of countenance, sunken eyes, and cold, clammy surface of skin are often present. In some cases the pain is not severe and the symptoms of collapse are but slightly marked.

[Perforation occurred in 34 of Osler's 685 cases (2.48 per cent.), and in 4680 cases tabulated by Fitz perforation took place in 6.58 per cent. It is more frequent in men than in women. J. E. GRAHAM.]

The importance of an early diagnosis is increased on account of the success of surgical operation when performed shortly after the occurrence of the perforation. The absence of liver-dullness is often an important sign demonstrating the fact that gas exists in the peritoneal cavity. It must be remembered, however, that extreme distension of the bowels may push the liver upward and backward to such an extent as to cause hepatic dullness to disappear in front. In such cases the dullness will be made out by percussion of the back to a greater extent than when gas exists in the peritoneal cavity. Hæmorrhage may accompany perforation.

The early diagnosis in perforation may be confirmed in some cases by a careful blood-count, when the number of leucocytes will be found increased. This is not always the case; perforation may be followed by leucocytosis; and, on the other hand, an increased leucocytosis may be present without perforation.

Peritonitis may occur without perforation. Inflammation and rupture of a mesenteric gland are sometimes the cause, and it may be caused directly by the presence of typhoid bacilli in the abdominal cavity.

Death may follow from collapse shortly after a perforation or the patient may rally and suffer from peritonitis. The latter is diagnosed by the presence of

pain and tenderness of the abdomen, and pinched expression of countenance, with rapid and feeble pulse. Death occurs on the third or fourth day after the attack. Recovery very rarely takes place.

The Spleen.—Enlargement of the spleen is present, according to Leube, in 90 per cent. of all cases, and Osler is of the opinion that it occurs in all cases. The enlargement continues until the fourth week, when it gradually disappears. The normal area of splenic dullness which extends in the midaxillary line from the ninth to the eleventh ribs may be increased upward and downward. The lower edge may often be felt under the costal margin upon deep inspiration. The enlargement is rarely accompanied by pain. Rupture has taken place spontaneously as well as from the result of a blow.

The Liver.—Jaundice is not a frequent symptom in typhoid fever. It results from toxæmia, abscess, or gall-stones.

The urine usually in jaundiced cases contains bile-pigment, albumin, and casts. The stools are not clay colored, but are dark and of the typhoid character. Epistaxis is frequent, and is severe in proportion to the severity of the jaundice.

Nervous System.—In mild cases and sometimes when the disease is severe, the patient remains conscious throughout, and there is little to be noted in connection with the nervous system. Headache is nearly always present in the early part of the disease. The pain may be felt over the whole head, in the occipital or frontal region, most frequently in the latter situation. It is usually dull, but occasionally may be so severe as to closely resemble that of meningitis.

The headache usually subsides about the end of the first or beginning of the second week. Pain in the back of the

neck is sometimes severe, and continues four or five days.

Pains in the back and limbs, varying in intensity, are experienced in a large proportion of cases. Painful sensations and hyperæsthesia in the feet are often noticed. Neuralgia, especially of the trigeminal nerve, occurs in some cases.

Delirium is one of the most frequent nervous symptoms. Its severity is not always in proportion to the severity of the disease, but depends, to some extent, on the individual. When, however, the delirium is active and uncontrollable, the prognosis is usually grave. It does not generally begin until the middle of the second week and ceases in the stage of convalescence. Sometimes it occurs only in the night, or for a few hours after waking, but it is usually continuous. In rare cases it is one of the earliest symptoms, and it occasionally lasts for three or four weeks after defervescence. The delirium is generally of a low, muttering character. The patient will try to get out of bed, but is easily induced to return. Sometimes the delirium is active and almost maniacal. A suicidal mania may develop, and, on that account, as well as to prevent injury, a patient in typhoid delirium should never be left alone. In some rare instances the same delusions are noticed from day to day throughout the disease. The writer had once a case in which the delusions of grandeur were manifested continuously. The patient was extremely happy, paying out enormous sums of money and making handsome presents to all his friends.

In many cases where delirium is not present the patient will answer questions in a rather incoherent manner, and even when nothing can be noticed which would indicate mental aberration. He will not afterward remember anything

which has occurred during the course of the disease.

In a few cases the delirium is of an hysterical character, and the differentiation between it and hysterical mania is made by the comparatively-mild type of the former.

In the third week, when the disease is severe, the patient may pass from delirium into an unconscious condition, which is marked by muscular tremor, carphologia, and subsultus tendinum. The urine and feces are passed involuntarily. The patient has a strange expression, and, although the eyes are wide open and the patient seems to follow the movements of his attendants, he is quite unconscious: a condition to which the term coma vigil has been given.

Convulsions are rare and occur most frequently in children. They may, in adults, follow thrombosis of the arteries or veins of the brain, when they take place late in the disease.

Neuritis occurs in a small number of cases. It is sometimes general, but, as a rule, the lower extremities are affected, causing a paraplegia. Hemiplegia is a rare occurrence.

Poliomyelitis, varying in severity, may follow typhoid fever.

The Skin.—A peculiar capillary injection of the skin is frequently noticed. This is of a bright-red or dark-red color and of an erythematous character. When present, it is usually found during the first week.

The odor of typhoid fever is of such a distinctive character that by means of it a diagnosis can sometimes be made. Cases have been reported in which a peculiarly distinctive odor was noticed, which was the forerunner of death. In one instance the other symptoms were not, at the time, of an alarming character.

The rose-colored spots appear at the end of the first week, usually over the abdomen and lower part of the chest; but they may be scattered over the body, and are found sometimes only on the back. They entirely disappear in the stage of convalescence, but return when there is a relapse.

They appear in successive crops, each crop not lasting longer than three or four days, and they leave a very slight discoloration. They are slightly raised above the skin, rarely vesiculated, and pressure causes them momentarily to disappear. The number of spots at one time may not exceed eight or ten, and only in occasional cases does it exceed fifty or sixty. They are never found on the cadaver. The number is not an indication of the severity of the disease. They are differentiated from acne by their small numbers, short duration, less papular character, and by their not containing pus. The blood drawn from the spots frequently contains bacilli. They are sometimes absent, especially in children.

Sudamina are found in the later stages of the disease when there has been much perspiration. They exist in the form of minute vesicles on the surface of the skin, which soon terminate in fine scales. Sweats are not usually present until the latter part of the disease, but in some cases they are a marked feature in every stage.

Throughout the disease the skin is, as a rule, hot and dry. The palms of the hands and soles of the feet present thick layers of epidermis of a yellow color.

More or less desquamation takes place, and the hair falls out during convalescence, but grows in afterward. Boils and abscesses often form on the back and buttocks during the stage of convalescence. Bed-sores are present on some

cases. Bluish patches of irregular outline are occasionally seen in this as in other diseases. They are the result of deep pigmentation, and occur only upon the skin of those who have body-lice. The *tache cérébrale*—a red line with white borders produced by drawing the nail over the skin—is a vasomotor phenomenon which exists in this as well as in other fevers.

Deafness is very commonly present during the first week, and in severe cases it is more marked toward the end of the second week. It disappears during convalescence unless there has been an inflammation of the middle ear, a condition which rarely occurs.

The conjunctivæ are often congested and the pupils dilated. Keratitis and iritis are sometimes present. The loss of accommodation is frequently found in convalescence, and an oculomotor paralysis, the result of neuritis, has been reported (de Schweinitz). Among rare complications may be mentioned retinal hæmorrhages, double optic neuritis, atrophy of the optic nerve, cataract, thrombosis of the orbital veins, and orbital hæmorrhage.

Temperature.—In many cases when the patient first consults a physician the temperature has already reached 102° or 103° , but when a chart has been kept from the very beginning it shows a gradual rise from day to day peculiar to typhoid fever. There is a daily rise from morning to evening from about $1\frac{1}{2}^{\circ}$ to 1° , and the temperature of the evening is the same as that of the following morning. This gradual rise continues until the end of the first or beginning of the second week. It then remains constant, with daily remissions, until the end of the third and gradually falls during the fourth week. In the third week there may be three

or four degrees of difference between the morning and evening temperatures. In the fourth week the fever is rather of an intermittent type, the morning temperature being normal and that of the evening showing a rise of 2° or 3° . In the abortive form, the fever may disappear at the end of the first week.

In mild cases the temperature, which may at first rise as high as 102° or 103° , gradually subsides until it becomes normal toward the end of the second week.

When a high fever exists for a number of days in succession, it is an indication of the severity of the disease. Those cases in which the temperature rises rapidly at first to 104° or 105° are apt to be severe. The writer has, however, observed instances in which the fever was high during the first four or five days, and afterward gradually subsided, and the course of the disease became mild and favorable.

The ordinary temperature-curve may be quite changed by the presence of complicating inflammations, especially of the lungs. Moderate fever is not always an indication of the mild character of the disease. Death from hæmorrhage or inflammation may occur in apparently mild cases.

A sudden fall of temperature toward the end of the second or during the third week is of serious moment, as it usually indicates either hæmorrhage or perforation.

Cases of apyretic typhoid have from time to time been reported in which the temperature has never risen above the normal standard, and in some there has been a decline as low as to 95° .

Cases occasionally occur in which the temperature in the fourth, fifth, or even sixth week pursues a most irregular course. They are often marked by rigors, with rapid elevations, sometimes as

high as 105° or 106° , followed by equally-rapid descents, often to below normal.

Such pyæmic curves may occur when there is no formation of pus to account for them, and not infrequently such patients make a complete recovery. The sudden exacerbations of fever are probably due to the absorption of septic matter through the ulcerated surface of Peyer's patches.

During the stage of convalescence moderate rises of temperature may follow indiscretions in diet, overexertion, or excitement, such as might be caused by the visits of friends.

In occasional cases a moderate elevation of 100° or 101° may be maintained long after the symptoms of fever have passed away. This is sometimes due to exhaustion, to deficient elimination, and to anæmia.

The Circulatory System.—The pulse in typhoid fever is slow in comparison with the temperature. It does not usually rise higher than 100° during the first week and part of the second week. It is then soft, compressible, and dicrotic. In the third week it may become small and rapid. Slight movements in the bed will, in most cases, produce increased frequency of the pulse. A sudden rise during the course of the disease is often an indication of a complicating inflammation or hæmorrhage. During convalescence occasionally the pulse continues rapid, and the writer has observed in one case its rapidity to be maintained for months.

Bradycardia (slow pulse), sometimes as slow as 30 per minute, is observed in some cases. This appears to be characteristic of certain epidemics.

In the milder form of the disease the heart may maintain its force throughout, but usually the apex-beat becomes perceptibly weakened, and the volume of

the first sound of the heart lessened in the latter stages of the disease. This weakening of the heart is due to degeneration of the myocardium. Occasionally a systolic bruit is noticed, and sometimes in convalescence œdema of the limbs may result from weakening of the cardiac walls from anæmia, or from venous obstruction.

Endocarditis and pericarditis are rare complications of typhoid fever. Venous thrombosis, however, is not unusual, occurring more often in the veins of the lower extremities.

This takes place late in the disease or during convalescence, and is very often attributed by the patient to some unusual exertion.

Literature of '97-'98-'99.

Among the 215 soldiers suffering from typhoid fever admitted to the Pennsylvania Hospital, there were 30 cases, or almost 14 per cent., of phlegmasia dolens, or milk-leg. In 18 of these 30 cases the left leg was affected alone in three, the right alone in two, and both in 13, the latter generally beginning on the left side when not appearing simultaneously in both. The greater tendency of this complication to occur in soldier patients may possibly be attributed to relaxation with distension of the venous system in the legs, due to marching, thus predisposing them to the disease. The primary factor in the etiology of the disease is a thrombosis of the veins, and not a phlebitis or periphlebitis. J. M. Da Costa (Boston Med. and Surg. Jour., Mar. 23, '99).

The blood has recently been studied by Thayer, who found that the red corpuscles gradually diminished after the first week, and that the anæmia after convalescence is extreme and requires very careful treatment.

The leucocytes diminish in number throughout the disease, reaching the lowest point toward defervescence. This

is an important diagnostic point, as in many inflammations the leucocytes are much increased.

The amount of hæmoglobin is lessened in greater proportion than the red corpuscles, and its return during convalescence is slow.

The Respiratory System.—The breathing is little affected in mild cases, but when the disease is severe the respirations become frequent and shallow.

Catarrhal laryngitis is occasionally present, causing greater or less hoarseness. (Edema of the larynx sometimes occurs. A sudden attack of dyspnoea may arise from inflammation and œdema. Bronchitis is so often present that it can scarcely be called a complication. It is usually mild in character. Dry and moist râles are heard in different parts of the chest.

Epistaxis is a frequent and early symptom. The amount of hæmorrhage is usually slight, but in some cases the bleeding is so great that it is necessary to plug the posterior nares to control it. This severe form of hæmorrhage occurs, as a rule, in the later stages of the disease.

The Urinary System.—A small amount of albumin is often found in the urine of severe cases. It is of the ordinary febrile character, and is not an important symptom. In the renal type albumin may appear at the earliest stage in large quantities and continue until the temperature falls.

Literature of '97-'98-'99.

In 346 cases of typhoid fever in von Leube's clinic, albuminuria was noted in 205, or in 59.2 per cent. In 37 of these 205 cases there were, besides the albuminuria, signs of nephritis present, namely: hyaline and epithelial casts. In every case of nephritis which might be classed as idiopathic, but which has a high temperature, the urine should be exam-

ined for typhoid bacilli and the blood tested for Vidal's reaction. Rostowski (Munch. med. Woch., Feb. 14, '99).

Sometimes retention is noticed early in the disease, and a catheter requires to be used throughout. Incontinence occurs late in some cases.

As a rule, the amount of urine is lessened during the first week, the specific gravity increased. The reaction, which is at first acid, afterward becomes alkaline. Toward the end of the attack and during convalescence the quantity of urine is increased and the specific gravity is lessened. Uric acid is always increased in the earlier part of the disease, and the chlorides are greatly diminished. During convalescence uric acid is diminished and the chlorides are increased.

The toxicity of the urine is greatly increased, especially when the cold-bath treatment is adopted. Pus is not infrequently found in the urine of typhoid patients. It may arise from cystitis or pyelitis.

The Osseous System.—In childhood and adolescence inflammation of the bone is not an uncommon feature of typhoid.

The symptoms may appear during the course of the disease, but more frequently in the stage of convalescence.

[In 237 cases collected by Keen, periostitis occurred in 110, necrosis in 85, and caries in 13. Bacteriological examinations were made in 51 cases. Typhoid bacilli were found in 38 and pyogenic organisms in 31. J. E. GRAHAM.]

Indolence, chronicity, and a remarkable tendency to recur are, perhaps, the most striking features of typhoid bone-lesions. (Osler.)

Literature of '97-'98-'99.

Ostitis typhosa ends in one of three ways, namely: (1) by absorption of the tumor; (2) the tumor becomes indolent and very tense, and may exist as such for several months and then finally dis-

appear; (3) by the formation of pus or necrosis. Abscess-formation or necrosis is, by far, the most frequent. A spontaneous recovery very rarely takes place, and in most instances surgical measures are required. Charles Green Cumston (Boston Med. and Surg. Jour., Mar. 16, '99).

Complications and Sequelæ.—Inflammation of the larynx, with stenosis or destruction of the cartilage, is an occasional complication. The patient becomes hoarse, and may have some difficulty in breathing. Sudden and fatal dyspnoea may take place in very weak patients, when the premonitory hoarseness is referred to weakness rather than to local disease.

The pulmonary inflammations are the most frequent complications of typhoid fever.

In a large proportion of cases more or less hypostatic congestion is present in the posterior portions of the lungs, notwithstanding the care taken by the nurses to prevent it. In many this terminates in consolidation, and a true broncho-pneumonia exists. This is shown by diminished resonance; fine, moist râles; and bronchial breathing heard over the affected part. Broncho-pneumonia may also arise from the presence of foreign bodies (deglutition pneumonia).

Croupous pneumonia may occur early in the disease, when Eberth's bacillus is probably the direct agent. It may also occur in the second and third week, when it is due to the presence of the pneumococcus.

The renal form of typhoid has already been described. Inflammation of the kidney is not a common sequel. It may, however, occur in the stage of convalescence.

Acute yellow atrophy has been described by Murchison as a sequel of typhoid fever. There are occasionally

abscesses of the liver, either single or multiple.

The principal symptoms of this form of suppuration are prolonged and repeated chills, great variations of temperature, profuse sweating, and pains in the hepatic region. Fluctuation, when present, is a valuable sign. The usual causes of abscess are metastasis, pyelphlebitis, and typhoid ulceration in the biliary passages, with secondary suppuration.

Much attention has recently been given to the relationship between typhoid fever and gall-stones.

The fact that gall-stones have been produced experimentally by injecting a culture of typhoid bacilli into the gall-bladder of rabbits, as well as the fact that pure cultures of these organisms have been made from the nuclei of gall-stones found in the human subject, leads to the conclusion that an attack of typhoid fever may, in some cases, be the direct cause of gall-stones and in others predispose to their formation.

Post-typhoid insanity, such as is usually caused by exhaustion, is noticed in a limited number of cases. It disappears within six months or a year.

Cases in which typhoid spine as a complication occurred have been recently reported by Gibney and Osler. Gibney ascribes the condition to an acute inflammation of the periosteum and the fibrous structures which hold the spinal column together. Osler is of the opinion that in many cases the condition is similar to that of hysterical or railway spine, and that it is really a post-typhoid neurosis.

Paraplegia and hemiplegia have already been referred to.

RELAPSE.—In a certain proportion of cases—from 3 to 15 per cent.—usually one and sometimes as many as three or four relapses take place.

They occur after an interval of three or four days of normal or subnormal temperature. They do not seem to be influenced by any form of treatment, and they frequently take place after a change of diet. It has recently been suggested that the digestion of solid food brings about an emptying of the gall-bladder of bile, which latter may be loaded with bacilli, and a second infection then takes place through the intestinal glands. West is of the opinion that any change of diet, even from one liquid to another, —from milk, for instance, to broths,—may cause a relapse.

There is a gradual, but more rapid rise of temperature than in the first attack. The pulse is increased in frequency and the rose-colored spots reappear, together with the characteristic abdominal symptoms. The intestinal glands become again swelled and ulcerated, but the lesions are found higher up the ileum than in the first attack. The spleen remains enlarged throughout the interval and the relapse. Death may occur from the same causes as in the first attack. Relapses do not usually last more than ten or twelve days. They sometimes occur without any interval, and are then called intercurrent relapses. As Wilson states, this may account for some of the prolonged cases of fever.

Elevations of temperature lasting two or three days and caused by excitement or errors of diet must be distinguished from a relapse. In the latter there is a reinfection because the patient has not become sufficiently immune during the first attack.

A second attack of typhoid fever is not common, but cases have been reported in which two or three distinct attacks have occurred.

INTERCURRENT DISEASES.—Many instances of the occurrence of another in-

fection with typhoid fever have been recorded. It was at one time thought that malarial fever was a frequent companion of typhoid, and the probability of a hybrid disease—typho-malarial fever—was strongly believed in by many physicians. It is doubtful if there is an instance in pathology of the combination of two diseases to form a third, and, since the discovery of the organism of malaria, the two diseases have rarely been found in the same person. There is therefore no reason for the existence of the term “typho-malarial fever,” and it should be excluded from the list of diseases. The close resemblance between some forms of the æstivo-autumnal type of malarial fever bears to typhoid has partly given rise to this error. Again, cases of typhoid fever sometimes occur with an irregularity of temperature, the result often of a mixed infection which strongly reminds one of intermittent fever.

Certain specific infections have occurred with typhoid fever; for instance, measles, erysipelas, and septicæmia.

Typhoid fever may occur during the course of such chronic diseases as tuberculosis and diabetes, when its course is much less favorable than under ordinary circumstances. In the latter disease the temperature does not exceed 102° or 103° , but there is a great tendency to adynamia.

Diagnosis.—The general diagnostic characteristics are gradual onset, slow rise of temperature with daily elevations, the compressible and dirotic pulse, epistaxis, the tongue coated with a white fur dense in the centre and disappearing at the edges, dullness of countenance, meteorism, appearance of rose-colored spots, enlargement of the spleen, and the absence of leucocytosis.

The early diagnosis of typhoid fever

has been found difficult on account of the slow development of symptoms and of their resemblance to those of other diseases. The difficulty has been largely removed by Widal's serum-reaction.

[The fact that the blood-serum from immunized animals had the effect of causing the movements of the bacilli to cease and to collect them in clumps had been observed by several pathologists. Gruber, at the Congress for Internal Medicine, 1896, read a paper on the agglutinative power of blood-serum of men who had suffered from cholera and typhoid fever. Widal introduced this method for the diagnosis of typhoid fever.

The profession of this continent was first directed to this means of diagnosis by Dr. Wyatt Johnson, of Montreal, in a paper read at the Buffalo meeting of the American Public Health Association, September, '96 (*N. Y. Med. Jour.*, Oct. 3, '96). Since that time the literature has increased to an enormous volume. J. E. GRAHAM.]

At present the serum for the test is obtained in three ways: from the fresh blood, from the dried blood, and from the fluid of a superficial blister. The first method is the one to be preferred, if possible, for counting leucocytes. The pipette of an ordinary Thoma-Zeiss hæmocytometer may be used and enough drawn up to half-fill the capillary tube, then sufficient sterilized broth is taken up to fill the bulb. In this way a solution of blood-serum 1 to 20 is obtained. The solution is passed into the tube of an hæmatokrit and the corpuscles separated. A drop of the solution is then added to a drop of the culture, making a strength of 1 in 40, and placed under the microscope. When typhoid fever is present the movements of the bacilli cease, and clumping takes place in from a few minutes to half an hour.

A macroscopical test may be made by adding the blood or serum to a young

culture of the typhoid bacillus, when the reaction begins in about two hours. The turbid liquid becomes clarified and a sediment forms of accumulated bacilli. (Osler.)

Literature of '97-'98-'99.

At the hospital in Milan during the last thirty years typhoid fever has been mistaken for acute tuberculosis 52 times, and tuberculosis for typhoid 90 times. A simpler test than Widal's consists in observing the behavior of 20 to 30 drops of blood drawn from the fingers of the patient into a small test-tube and allowed to remain at rest for twenty-four hours. When the resulting coagulum is observed, it is found that in typhoid hardly any serum is formed, the clot is not retracted. In tuberculosis there is marked retraction of the clot from the sides of the tube, and abundant formation of serum. Carlo Bareggi (*Gazz. degli Osped.*, Mar. 12, '99).

To Wyatt Johnson belongs the honor of introducing the method of examining the dried blood, which has done so much to make this means of diagnosis of so much practical value to physicians both in the city and country.

Literature of '97-'98-'99.

Result of 297 examinations using dried instead of liquid blood-serum. The preliminary drying of the blood did not seem to interfere with the production of the reaction, and enabled the attending physician to transmit the samples from a distance. The following conclusions were arrived at: 1. The use of dried blood-serum has given us what appear to be satisfactory results for diagnostic work. 2. Complete reaction was rarely delayed beyond the fifth day. 3. A complete reaction was obtained as early as the second day. 4. Typhoid blood allowed to dry sixty days still gave the typical reaction. Johnston and McTaggart (*Brit. Med. Jour.*, Dec. 5, '96).

From a practical point of view the reaction can, in general, be detected in typhoid patients from the first day of the disease onward. It may at times be

delayed, but is only exceptionally absent: 1 case in 177, according to my figures. One can hardly expect more from a method based on a bacteriological reaction always subject to individual and unforeseen variations. Widal (*Brit. Med. Jour.*, Dec., '97).

In more than 90 per cent. of cases of enteric fever a positive reaction may be obtained by means of Widal's reaction; in more than 99 per cent. of these cases examined between the fourth and seventh day, inclusive, a positive reaction may be obtained; in more than 3 per cent. of diseases other than enteric fever a reaction is produced indistinguishable from the typical typhoid reaction; and a negative reaction is obtained with the blood of healthy persons who have not had enteric fever lately. J. C. Da Costa (*N. Y. Med. Jour.*, Aug. 21, '97).

The method of serum-diagnosis of typhoid fever is of great practical value. The alteration of the blood on which this method is based is a specific effect of infection or intoxication with the typhoid bacillus. The microscopical serum-test is to be preferred to the macroscopical methods. Quantitative determinations, relating especially to the culture, the time-limits, and the dilution of the serum, are of importance, and, at least in doubtful cases, should not be neglected. As the reaction may be delayed or occasionally absent, a negative result of the test does not exclude the diagnosis of typhoid fever. The persistence of the reaction, sometimes for years, after recovery from typhoid fever, is to be borne in mind in interpreting the reaction in febrile conditions. The appearance of the reaction and its increase during the period of observation speak for fresh typhoid infection. The danger of mistakes from positive reactions in non-typhoid cases can be guarded against in nearly all cases. William H. Welch (*Journal Amer. Med. Assoc.*, Aug. 14, '97).

Prognostic significance attributed to the degree of agglutinative reaction. If there is progressive rise having its fastigium coincident with the fall in the temperature-curve, followed by a descent parallel with that of the temperature, the prognosis is favorable. In cases that

are serious from the clinical point of view a slight agglutinative power is unfavorable. A feeble agglutinative power at the height of the fever of unfavorable import. Courmont (*Lyon Méd.*, Aug. 8, '97).

The agglutinative action of serum tested throughout the different stages in twenty-one cases of typhoid fever. The curve of the reaction throughout the whole course of the illness is a variable one; it is sometimes slightly marked at first, and increases progressively, or it may remain the same all through. As a rule, it diminishes more or less rapidly during convalescence or even during defervescence with remarkable rapidity, but exceptionally it lasts for months or years. Widal and Siccard (*Science Méd.*, Feb., '97).

The agglutination-test is of the utmost importance in finally settling the diagnosis in doubtful cases. It is a good rule to treat all doubtful cases in which, for a time, the differential diagnosis between subacute or acute nephritis and enteric fever cannot be made, as acute cases of enteric fever. J. C. Wilson (*Amer. Jour. Med. Sci.*, Dec., '98).

The Widal reaction in typhoid fever does not permit an early unequivocal diagnosis of the disease. The reaction is an immunity reaction, and not merely a reaction of infection. Due attention being given to the severity of the case, the stronger the reaction, the more favorable is the prognosis. The test has been personally made in 51 individuals who had had typhoid fever. In 20 cases the reaction was positive during the first year after the disease, and in 11 negative. Of those examined more than a year after the fever, 6 were negative and 11 were positive, 1 each after 14, 15 $\frac{1}{2}$, and 17 months, and 3 after 4 $\frac{1}{2}$, 2 after 4 $\frac{3}{4}$, and 1 each after 5, 10, 15, and 21 years. Of the cases in the first year after the disease, 64.5 per cent. were positive. Of 11 cases from the second to the fifth years after the disease, 8, or 72.7 per cent., were positive. If in a case suspected of typhoid fever, the reaction is very strongly positive, it is connected with the present illness, and not with a former attack of the disease. In chil-

dren under seven years the reaction is feebler than in older persons, and it disappears earlier; nevertheless, it is, in children, perhaps the most valuable sign of typhoid fever. Kasel and Mann (Münch. med. Woch., May 2, '99).

Previous to the introduction of Widal's test the diagnosis of typhoid fever was sometimes confirmed by the finding of the typhoid bacillus in the blood from the spleen or from the rose-colored spots. These methods have been superseded and are not now employed. The same might be said of Elsner's and Capaldi's methods of cultivating the bacilli from the stools of typhoid patients.

The diazo-reaction of Erhlich is still considered a valuable test. Two solutions are used: one a saturated solution of sulphanilic acid in a solution of hydrochloric acid (50 cubic centimetres to 1000 cubic centimetres), the other a $\frac{1}{2}$ -per-cent. solution of sodium nitrite. The test is made as follows: To a small quantity of urine in a test-tube an equal quantity of the sulphanilic-acid solution and a solution of sodium nitrate is added. A solution of ammonia is now allowed to flow down the side of the test-tube. It forms a clear layer above the urine and at the junction a layer of reddish color will be noticed. When the tube is shaken the foam presents a well-marked pinkish tinge. The test is readily applied, but has the disadvantage of being present in malaria, tuberculosis, and in some febrile conditions.

Modern methods of examining the blood may be of value in diagnosis. Thayer is of the opinion that ("Post-typhoid Anæmia," page 109) the examination of the leucocytes may be of great value. The examination of a fresh specimen of the blood may exclude malaria by the absence of the *Plasmodium malarie*. In tuberculosis with local inflammation and in acute tuber-

culosis there is an increased leucocytosis.

In the absence of leucocytosis and the change in the relative proportion of the different varieties of colorless corpuscles one to another we have two valuable points, which, while neither may be pathognomonic, are of considerable diagnostic value.

The differentiation between typhoid fever and malaria has already been referred to. The therapeutic test, the administration of quinine, will sometimes distinguish between the two diseases.

Lobar pneumonia of the pneumococcal origin may be difficult to distinguish from that produced by the typhoid bacillus. The methods already mentioned, Widal's reaction and the blood-examination, will be sufficient if one is only on his guard to make the tests. Pyæmia from some concealed source is often mistaken for typhoid fever, and the tests just mentioned are of great value. Septic endocarditis may closely resemble typhoid.

The approach of the organism, on the one hand, to the typhoid bacillus and, on the other, to the colon family is well shown by the cultured properties. The effect on milk and the non-production of indol are like the typhoid bacillus, and in the fermentation of glucose it resembles the colon family.

Etiology.—Typhoid fever is caused by the introduction of the bacillus typhosus into a system not immune to the disease; by its subsequent growth, which occurs usually in glandular structures; and by the development of a special form of poison.

The disease is more prevalent during certain seasons of the year and under certain circumstances, owing either to an increased number and virulence of the

micro-organisms or to a lessened power of resistance in the individual.

Age seems to exert an important predisposing influence. It is rarely found under two years and not often after fifty. A case has been recorded of an infant at six months, and the disease has even been found in the fœtus.

Analysis of 284 cases of typhoid fever in childhood:—

	Per-centage
Up to five years.....	3 1
Five to ten years.....	77 27
Ten to fifteen years.....	204 72
	284

Vogel, in 1017 cases, found 412 between five and ten years of age and 393 between ten and fifteen. Collectively they show a comparatively small number in the first five years, while the remainder are about equally divided between the two other periods. John Lovett Morse (Boston Med. and Surg. Jour., Feb. 27, '96).

Observed four cases in children under two years of age in an epidemic of four hundred and six cases, when the infection was traced unmistakably to the milk-supply. W. P. Northrup (Archives of Ped., Jan., '96).

Literature of '97-'98-'99.

Investigations made by means of Widal's serum-reaction on 50 cases of suspicious gastro-enteric disturbances in children: 1. Typhoid fever, as has been commonly believed, is an unusual disease in infancy. 2. It is possible that women whose blood gives a positive Widal reaction, even though it be years after the occurrence of the disease, may in some way transmit this to their infants. J. L. Morse and H. W. Thayer (Boston Med. and Surg. Jour., Jan. 12, '99).

Cases have also been reported of the disease in patients over seventy years of age. The writer attended during the past year a patient of sixty-eight. Infants are probably exempt on account of

lessened exposure, and old people are rendered immune from previous attacks, but these are not altogether sufficient reasons. Infants are frequently brought up on cows' milk which may contain bacilli, and a large number of individuals pass through middle life without having had typhoid fever. The great majority of cases occur between the ages of fifteen and thirty. Of 1375 cases treated in the Toronto General Hospital from 1890-'97, inclusive, 1016 occurred between the ages of ten and thirty. The mean age in 1772 cases, according to Murchison, was twenty-one years.

Males and females seem equally liable to the disease, although in hospital statistics males predominate. Of 1375 Toronto Hospital cases, 874 were males and 504 females. According to some statistics, boys are more frequently affected than girls. This may arise, as Wilson has pointed out, from the fact that boys, in their out-door sports, are more exposed by drinking impure water.

The great majority of cases occur during the last four months of the year, and from February to May there is a comparative freedom from the disease. Special epidemics may take place at any season and some of the most severe have prevailed during the spring months. Eight hundred and twenty-eight of the 1375 Toronto cases came into the hospital during the last four months of the year.

It is especially prevalent after hot, dry seasons and less so when the summer has been wet and cold. Recent experiments by Robertson demonstrate the fact the typhoid-fever germs grow luxuriantly in the soil during the summer and remain dormant in the winter.

Locality seems to make little difference. It occurs with equal prevalence in cities, towns, villages, and country houses.

Soldiers in camps seem especially liable to the disease, on account of the ease whereby the virus may be conveyed from one to another.

According to Pettenkofer, the condition of the soil has much to do with the causation of the disease. It is more prevalent when the ground-water is low after a dry season, and an outbreak of the disease frequently follows a heavy rain-storm after a period of drought. The disease may be more readily conveyed in dust during the dry season (Baumgarten).

Typhoid fever sometimes occurs far away from human habitation. One form of what is called *mountain-fever* is essentially typhoid in character. The cause of the disease may exist in canned meats and milk, which are the principal food of miners and prospectors. This explanation does not seem sufficient, because, in some district of the Rocky Mountains, almost every newcomer is liable to take the disease. The possibility of the wide distribution of the typhoid germ in the soil and in inferior animals has been given as an explanation for such cases.

Typhoid fever is a very widely distributed disease. It is endemic in Europe and North America. In America it prevails equally from Hudson Bay to the Gulf of Mexico and from the Atlantic to the Pacific.

Individual immunity may be either hereditary or acquired from a previous attack. It is quite probable that the individual when weakened by overwork from unhealthy surroundings or from a previous disease is more liable to an attack of typhoid. In a large proportion of cases, however, the previous health of patients has been good.

The Bacillus Typhosus.—Pathologists have been for many years of the opinion that typhoid fever was caused by a dis-

inct virus. Flint, in the second edition of his work, published in 1867, wrote as follows: "Assuming these statements to be correct, typhoid fever is one of the diseases the special cause of which may be generated without the body and reproduced within the body."

The bacillus discovered by Eberth, a short, thick, straight or very slightly curved, rod-like body with rounded extremities is now looked upon as the cause of the disease. It is found especially in the intestinal and mesenteric glands and in the spleen and occasionally in many other parts of the body, as well as in the blood.

After the first ten days these organisms are found in large numbers in the passages from the bowels. They can be readily differentiated from the *b. coli communis*, with which they were at first confounded. These organisms are found in all cases of typhoid fever, and they can be cultivated outside the body. For some years all attempts to inoculate animals failed. Abbott reported a case in which the disease had been communicated to rabbits by inoculation. The typhoid bacilli were found in enlarged mesenteric glands and in the spleen. More decided cases of the communication of the disease to inferior animals have recently been reported.

If these conclusions are confirmed by further experiments, the three requirements of Koch's law will be amply satisfied and the bacillus of Eberth will be as conclusively proved to be the cause of typhoid fever as Koch's bacillus of tuberculosis.

So far as is known in the great majority of cases, the port of entry for the bacillus is the alimentary canal.

The most frequent source is the drinking-water, but it may be taken in milk and other articles of diet. Bacilli may

be inhaled in the form of dust into the mouth and pharynx and afterward swallowed. It is possible that the organism may be inhaled into the lungs and may invade the system in that way. Cases of pneumonic typhoid have recently been reported which demonstrated the possibility of this mode of invasion.

Many local epidemics have resulted from the pollution of drinking-water, and one especially which occurred in Plymouth, Penna., in 1865, demonstrated positively this mode of the introduction of bacilli into the system. Plymouth was supplied from a reservoir into which ran several small streams. During January and February a case of typhoid fever occurred in a house on the bank of one of the streams. The dejecta were thrown out upon the snow and became frozen. About the end of March, a thaw and rain-fall took place, which carried the impurities into the reservoir. Toward the middle of April typhoid fever appeared in different parts of the city supplied with water from the reservoir. Twelve hundred cases occurred in a town with a population of eight thousand. The Maidston epidemic was caused in a similar way.

The water from contaminated wells is a frequent source of disease, and this is more especially the case in smaller towns where there are neither water-works nor sewerage. Water from such wells is deceptive, as it is frequently clear and sparkling and is preferred to that of a much purer quality.

Milk is frequently a medium of transmission. The bacilli are introduced by washing of the pans with impure water. They will afterward multiply in the milk itself, which is a good culture-medium. Direct contamination may take place when those who milk the cows are in attendance upon typhoid patients. Milk

allowed to remain open to the air may be contaminated by dust or by flies conveying the bacilli.

Oysters are a not-infrequent source of contagion, and epidemics have been brought about by their consumption. The oysters are fattened in ponds communicating with the estuaries of rivers, the water of which is polluted with sewage.

Klein made an investigation with regard to the presence of bacilli in oysters, and found them in only one instance in those supplied to the trader. He demonstrated the fact that when oysters are placed in water containing bacilli these organisms will be found within the shells as late as the seventeenth day after their removal from the water, establishing clearly the possibility of the conveyance of typhoid fever by this means. It is probable that other articles of food may become contaminated by germs which arise from dried filth. Typhoid bacilli may also be taken in on the surface of raw vegetables which have been washed in water containing typhoid organisms.

The principal source of the bacillus is in the passages from the bowels of typhoid patients. They are also given off in the urine, vomited matter, and sputum, and they may possibly be exhaled from the lungs. Not a great deal is known of the life of the micro-organism outside of the body. They multiply in water and in the soil.

Direct Contagion.—Cases of what appeared to be direct contagion have from time to time been reported. The attendants upon patients become ill in so short a time that it did not seem possible that the fever was commenced in the ordinary indirect way. In such instances the typhoid germ may be inhaled into the mouth and pharynx and afterward swallowed. Practitioners in the country

have sometimes observed that, when a case of fever is imported into a previously healthy home, the attendants will, inside of two weeks, be attacked by the disease.

Pathological Anatomy.—The lesions of typhoid fever are found principally in Peyer's patches and solitary glands of the small and large intestines in the mesenteric glands and in the spleen. Changes are also found in the gall-bladder and the muscular structure throughout the body, especially that of the heart. Ulceration of the stomach is very rarely present.

Peyer's patches are made up of a collection of glands, and exist principally in the lower part of the small intestines. The change first noticed in them is an elevation above the surface, due to infiltration of the glandular structures with leucocytes. The elevation is usually of an elliptical form lengthwise with the lumen of the bowel. The induration is of a whitish or opaque appearance, and may extend beyond the glandular structure even through the muscular and serous coats of the intestines.

This swelled condition reaches its height about the end of the first or the beginning of the second week, when resolution may take place. In some death follows from the severity of the fever before the commencement of necrosis of the glands.

The circulation in the patch becomes impeded by inflammatory exudations and by innumerable colonies of bacilli, which produce virulent toxins. The slough which begins to form on the surface may involve a part or a whole of the gland. It usually extends to the submucous coat, but may exist more deeply. Often the necrosis takes place in several different parts of a patch, and three or four distinct ulcerations may be found in one gland.

Ulceration begins at the edge of a slough, gradually separating it from the healthy tissue and leaving an ulcer with excavated edges, oval in form, presenting a smooth base of submucous, muscular, or peritoneal tissue. When death occurs, some glands may be found in the first stage, and often the three conditions—swelling, necrosis, and ulceration—will be found in the same patient. The process becomes more severe toward the cæcal valve. During and after the separation of the slough healing takes place, leaving a slight depression and causing little or no contraction of the lumen of the bowel. The mucous membrane gradually extends over the site of the previously-existing ulcer. This takes place in the third and fourth weeks. In some cases the ulceration extends through the peritoneal coat, allowing the contents of the intestines to pass out into the peritoneal cavity.

During the process of sloughing and ulceration slight extravasation of blood may take place from distended capillaries, and sometimes an artery is opened, causing severe and fatal hæmorrhage. Secondary ulcerations occasionally occur in the cicatrices, which are said to cause hæmorrhage more frequently than in the primary form.

The solitary glands of the small intestines are not always affected, but when involved present roundish elevations and ulcerations. The solitary glands of the large intestines undergo the same changes. The necrosis and ulceration follow in the same way as in Peyer's patches.

The mesenteric glands are enlarged from the presence of leucocytes and contain numerous colonies of bacilli. Occasional softening, breaking down, and rupture take place, causing fatal peri-

tonitis. Hæmorrhage may also arise from this source.

The spleen is enlarged, but never to a great extent. Osler never found it weighing more than 20 ounces. The substance is soft, and infarcts are not infrequently found. Ruptures may take place from accidents or spontaneously.

This organ may be slightly enlarged and soft in consistency. The lesions most frequently found are lymphoid nodules and small, grayish, opaque areas. The latter vary in size, sometimes involving only a few hepatic cells and sometimes half a nodule. They are foci of necrosis which do not bear any relation to the colonies of bacilli and are probably produced by the toxins of the disease. As a rule, these do not give rise to any symptoms, but when extensive may afterward terminate in cirrhosis (Osler). Swan (Brit. Med. Jour., July 16, '98) reports a case of hepatic abscess caused by the bacillus typhosus. The abscess resulted from infective pylephlebitis by direct extension from the intestinal ulcer. Bacteriological examination of the abscess-contents revealed the presence of typhoid bacilli, which gave the usual Widal reaction with typhoid serum. The patient, a female child, 5 years of age, was operated upon and the abscess, which existed about half an inch below the surface of the liver, was evacuated. Recovery followed.

Osler (Edinburgh Med. Jour., Nov., '87) speaks of suppurative pylephlebitis as one of the rarest sequelæ of typhoid fever. Of solitary abscesses the Munich statistics give 12 out of 2000 cases. Suppurative cholangitis may terminate in abscess of the liver, and abscesses may follow the formation of pus in other parts of the body. Louis has recorded a case which followed suppuration of the parotid. In a case of Chvostek's two

large hepatic abscesses followed bone-lesions.

Literature of '97-'98-'99.

Abscesses in the soft parts due to the bacillus typhosus are usually single. They appear during the latter weeks of fever or early in convalescence. They run an acute course. In this respect they contrast strongly with post-typhoid bone-lesions, whose course is characterized by chronicity and a marked tendency to recurrence. They produce few constitutional symptoms. They heal rapidly after incision. Pratt (Brit. Med. Jour., Jan. 28, '99).

Blackstein in 1891 found typhoid bacilli in the biliary passages of rabbits some weeks after they were introduced into the gall-bladder.

Chiari found typhoid bacilli in 19 out of 21 cases. They existed in large numbers in most of the cases. He thinks that a reinfection might be caused by the emptying of the gall-bladder after a full meal and the filling of the intestine with an infected fluid. Murchison states: "The lining of the gall-bladder is very liable to become inflamed in enteric fever without producing any marked symptoms during life."

In ordinary cases the kidneys are little, if any, affected. In the severe forms cloudy swelling of the epithelial lining, with degeneration, may be present. Small areas of round-celled infiltration, in which softening and suppuration may take place, are referred to by Osler. Nephritis occasionally sets in during the post-typhoid period. Catarrh of the bladder is sometimes met with, and may be brought on by the careless use of the catheter for retention. Diphtheritic inflammation of the pelvis of the kidney and bladder has been noted.

The heart-muscle is more or less degenerated. In severe cases the heart is flaccid and easily torn, and the muscle

presents a reddish-brown color. Endocarditis and pericarditis are rare complications. Endarteritis with thrombosis is sometimes met with. Thrombi and emboli may contain bacilli. Phlebitis with thrombosis, especially in the lower extremities, is a frequent lesion.

Inflammation of the lining membrane of the larynx is sometimes met with, as well as of the deeper lesions involving the cartilage. These terminate sometimes in stenosis, ulceration of the cartilage, with formation of pus, which may penetrate into the mediastinum. Emphysema sometimes results. The danger of ulceration of the cartilage is shown by the mortality: 71 out of 75 cases (Keen).

Lobar and broncho-pneumonia have been already referred to. Pleurisy and empyema are very occasionally found after fever.

Zenker has described two forms of muscular degeneration: the granular and the waxy. The former is similar to the advanced stages of fatty degeneration, and in the latter the contractile substance is changed into a waxy, homogeneous mass. This form of degeneration occurs in other fevers as well as in typhoid. Inflammation of the meninges is not a frequent complication. Typhoid bacilli have been found in the suppurative form. I had under observation some years ago a case of typhoid fever with symptoms of meningitis and with well-marked neuritis. The patient recovered.

Hoffmann has described an atrophy of the brain in the later stages with smaller size of the convolutions and greater width of the lateral ventricle. Degeneration of the ganglion-cells as well as of the nerve-fibres has been described. This is present in many cases when there are no symptoms of neuritis.

Galezowski has classified the patho-

logical condition of the eye in typhoid fever into: Necrosis of the cornea; thrombosis of the ophthalmic and orbital veins; emboli of the central artery of the retina; optic neuritis with atrophy of the disk (de Schweinitz).

General Pathology.—The question has been much discussed as to whether the intestinal lesions of typhoid fever are the result of a local infection or are a local manifestation of a general disease.

The theory of general infection is supported, to some extent, by Sanarelli's experiments. He found that whether the bacilli were introduced under the skin or into the peritoneal cavity, the principal lesions were found in the abdominal organs, and an acute mucous inflammation of the intestine existed, as well as swelling of Peyer's patches. Martin points out the fact that these lesions are the result of the toxins, and not of the bacilli, and are produced also by other toxins, as those of the colon bacillus, Gärtner's bacillus, as well as by the vegetable toxins: abris and ricin. Ulceration has rarely followed such intravenous or subcutaneous injections.

The fact, previously mentioned, that Remlinger has produced in animals the intestinal lesions by feeding them with a pure culture of typhoid bacilli and that the result has not previously been reached by subcutaneous injections would confirm Martin's view.

Prognosis.—Death in typhoid fever may result from asthenia, or from intercurrent diseases and accidents, the results of typhoid lesions. The severity depends upon the virulence of the poison, as well as upon its amount and on the nature of the soil. This has been demonstrated by experiments on animals.

The rate of mortality in typhoid-fever cases is from 7 to 15 per cent. Cayley gives that of the Continental hospitals

at from 7 to 15 per cent. Delafield collected 1305 cases of typhoid fever in five years in the New York Hospitals, with a mortality in 1879 of 21 per cent. and in 1880 of 30 per cent. (Wilson.)

Murchison's statistics of 18,612 cases collected from British and Continental hospitals gives 18.62 per cent. of deaths. They also prove that the mortality is lower between ten and fifteen years of age.

The previous condition of the patient bears some relation to the prognosis. A system weakened from overwork or unhealthy surroundings, or one with a family history of tuberculosis, will not withstand the disease as well as one who has been previously strong and healthy.

When the temperature rises suddenly at first and remains high for a number of days, the prognosis is usually grave. The writer has had under observation cases of rapidly-rising temperature when the temperature, after four or five days, partially subsided, the disease afterward running a comparatively mild course.

Deaths in the first week from an overwhelming disease are rare. Death from asthenia is usually delayed until the third or fourth week. A continued high temperature, delirium, and ataxia, with tremors and diarrhœa, may have been present throughout.

Literature of '97-'98-'99.

When true meningitic symptoms occur in the course of typhoid it is nearly always fatal. Maragliano (*Gazz. degli Osp. e delle Clin.*, Apr. 16, '99).

A fatal result should not be confidently predicted, even in the most severe cases. It is surprising how weak a patient may become and how long the weakness may continue and recovery still take place. Sudden death from cardiac complications, as heart-failure or delirium cordis,

occurs more frequently in men than in women. Persistent vomiting is a grave prognostic symptom.

In cases of pregnancy abortion occurs in a large proportion, and death often follows. The mortality is about 20 per cent. When typhoid occurs in childbed the prognosis is unusually grave. In seven cases reported by Liebermeister, three died.

The previous habits of the patient, especially the alcohol habit, has a strong influence in increasing the mortality. Of nineteen notorious drunkards admitted into the Basel hospital seven died, more than one-third (Liebermeister).

The prognosis is rendered more grave by the presence of intercurrent diseases: bronchitis, lobar pneumonia, the invasion of the streptococcus and staphylococcus. It has recently been shown by Martin that the typhoid bacilli are more virulent when other organisms are present in the system. When patients suffering from tuberculosis, emphysema, and diabetes are attacked by typhoid fever, the outlook is grave. This is also the case with elderly people.

Death from hæmorrhage occurs in 3.77 per cent. of all cases, according to Murchison's statistics. A moderate amount of hæmorrhage may take place without danger. When frequent small extravasations occur daily, patients may still recover, although they indicate active ulceration and consequent danger of perforation. They are premonitory symptoms of severe hæmorrhage, although the latter may occur in cases which have been running a mild course. The possibility of sudden death from cardiac weakness should always be borne in mind.

Treatment.—**PROPHYLAXIS.**—The important measures for the prevention of typhoid fever are:—

1. The isolation of the patient and thorough disinfection of the excreta.

2. The careful inspection of the drinking-water, as well as the source of supply and the means by which it is conveyed.

3. Careful inspection of the food, especially of the milk.

4. Cleanliness of the surface, the removal of garbage and other impurities, and the prevention of the saturation of the soil by sewage.

1. The complete isolation of the patient is necessary for many reasons. The attendant upon a typhoid case may convey the bacilli directly by handling food or drink, which is given to healthy members of the household. If care is not taken, the excreta may become dried and the germs may be scattered about in the dust or a few of them may light on milk or meat and there multiply indefinitely. Dried bacilli may be inhaled and swallowed, or possibly they may be inhaled into the lungs and there multiply.

The sick-room should be well ventilated and absolutely clean. The patient should be sponged regularly and all soiled clothing at once removed. The nurse should cleanse her hands with a mild disinfectant solution whenever they are soiled.

The disinfection of the discharges should be very thoroughly made, and in small towns and country places they should not be thrown into the ordinary privy or cess-pool, but should be buried. The urine should be treated in the same way, as it frequently contains bacilli.

W. Gilman Thompson (New York Med. Jour.) gives the following directions for the disinfection of the excreta: A solution 1 to 500 of corrosive sublimate, rendered acid to prevent the formation of albuminate, is a powerful disinfectant, but has an injurious effect on the plumbing. A 10-per-cent. solu-

tion of carbolic acid may be substituted. A half-pint of this may be kept constantly in the bed-pan, which must be covered. After a movement the perineum should be cleaned by a 1 to 2000 solution of corrosive sublimate. In the country the stools should be mixed with saw-dust and cremated or buried in a trench four feet deep. The disinfection of the stools should be continued for three or four weeks after the temperature has become normal.

In the disinfection of excreta chlorinated lime is very frequently employed. A part of a solution of 4 ounces to the gallon is used for each stool. A thorough mixture should be made and allowed to stand fifteen or twenty minutes before it is thrown into the water-closet. The latter should be frequently flushed. A solution of corrosive sublimate and permanganate of potash, 2 drachms of each to a gallon of water, has the advantage of being odorless, but is a strong poison.

The soiled clothing may be disinfected by being first placed in a weak solution of corrosive sublimate and permanganate of potash and afterward subjecting it to boiling in water for half an hour. The solution is made by dissolving corrosive sublimate in water 1 to 16. Take 4 ounces of this to a gallon of water and add to it 1 drachm of potassium permanganate. Of this standard solution 1 fluidounce added to a gallon of water will make it sufficiently strong for the disinfection of clothing (Shattuck). A 5-per-cent. solution of carbolic acid may be used for the same purpose.

2. Typhoid fever is, no doubt, in the great majority of cases a water-borne disease. This has been proved to a demonstration by the lessened mortality of cities from typhoid after a system of water-works has been introduced and pure water obtained. Bacilli have not

only been found in the drinking-water, but their multiplication especially in that containing sewage has been amply demonstrated. It is probable that a small number of bacilli may be sufficient to produce the disease in an individual predisposed to it. The multiplication of germs in impure being so much greater than in pure water shows how necessary it is that, apart from the presence of bacilli, the water should be free from all contamination. The source of supply should be carefully and frequently inspected. It has been abundantly shown in the past that water which is thought to be pure may at any time accidentally become polluted.

The well in country places should be situated at a distance from any source of contamination. It should be deep and protected to prevent the surface-water from running in. Well-water should be occasionally inspected for general impurities as well as bacteriologically.

When water is not pure, boiling and filtering should be recommended. Filtering, such as done on a large scale in London, England, renders water almost free from typhoid bacilli. Boiling will destroy all germs, but will not remove the toxins.

Ice is often the source of typhoid fever, as the bacilli are not destroyed by freezing. It is therefore safer to cool water in a refrigerator than to place ice in it when the source of the latter is not well known.

3. Several epidemics of typhoid fever have been produced by contaminated milk. In all large cities dairies should be inspected to see that the disease does not exist in the neighborhood, that the utensils are cleansed with pure water, while general cleanliness is insisted upon. If milk be suspected to contain bacilli, the danger may be removed by boiling.

The introduction of typhoid germs by

oysters would seem to be easily prevented by interdicting or regulating the fattening process for which the oysters are placed in fresh water, when the latter is often impure. Oysters obtained from their beds in the deep sea are not contaminated.

4. Good drainage is an important factor in the prevention of typhoid in cities and towns. There is a direct relationship between the amount of impurity of the soil and the number of cases of typhoid fever. In the cities of Munich and Vienna, when the soil had been saturated with sewage for years, the introduction of pure water from without reduced the mortality to a considerable extent, but it was not until thorough drainage was made that the greatest reduction in the numbers of typhoid cases took place. When the streets and lanes are kept free from garbage, manure, and other impurities the liability to typhoid is lessened. This can be better understood when we know, from the investigations of Martin and others, that the bacilli grow much more rapidly in soil saturated with sewage and that the hot weather of summer is favorable to their growth.

For years typhoid has been looked upon as a filth disease, and it is still equally true that cleanliness is one of the best measures of prevention. It was at one time thought that this disease was caused by defective plumbing. Dried germs may possibly be introduced into a dwelling in this way. It is, however, probable that a condition of the system may thus be brought about which becomes easily affected. Vaccination against typhoid fever has received much attention from pathologists recently, but clinical application of this measure has been too limited to warrant more than a passing notice.

General Management of Cases.—Care-

ful nursing at the commencement and throughout the disease is one of the principal factors. The importance of early treatment is shown by Osler's statistics of the deaths in 229 cases: 9.5 per cent. of the patients died who had been admitted during the first week, 6.2 per cent. of those in the second week, 12 per cent. of those in the third week, and 25 per cent. of those in the fourth week. The danger of moving patients after the first week is recognized by all physicians. Patients are often conveyed with comparative safety a long distance in railway carriages especially fitted up for the purpose.

It has also been clearly established that rest in the recumbent posture is of the greatest importance. A single bed (for convenience in nursing) with a hair mattress on springs should be selected. A rubber cloth should be placed under the sheet and the covering should be light. Two beds may be used in some cases, so that, if necessary, the patient can be moved from one to the other.

If at home, a room should be chosen which is most separated from the remainder of the house and at the same time convenient for the nurse. In cities a back room is to be preferred on account of the street-noises. The patient ought to remain in the recumbent posture all the time. A bed-pan and urinal should be used. The body should be sponged night and morning, the night-dress and sheets changed each day, and soiled clothing removed at once and placed in a disinfectant solution. The excreta should be carefully disinfected.

In hospitals typhoid-fever patients are frequently placed alongside of those suffering from other diseases. There is no special danger in this so long as the greatest care is taken in the disinfection of the excreta. The fact, however, that nurses often take the disease after at-

tendance upon fever patients, and, further, that it is frequently difficult to induce the ward-tenders, who are not so well educated as the nurses, to be thorough in disinfection would lead one to believe that it is desirable to isolate typhoid patients in hospitals.

The patient should be kept as quiet as possible and his wants attended to with regularity and care. Friends, even those of the family, should not, as a general rule, be allowed to remain any length of time in the room. He should never be left alone even when there is no delirium. He may try to rise, and, if delirium is present, there is much danger. Patients have been known to destroy themselves by jumping from the window.

Fluids, especially cold water, should be given freely to produce a free diuresis, and thus rid the system of poison.

The temperature should be taken at least night and morning and recorded in a chart. The use of a chart is of much importance, because the attending physician frequently gains a much better idea of the case by examination of the chart than by looking over a list of temperatures.

After the subsidence of the fever the sponging should be continued, and followed by gentle massage. During convalescence the patient should be taken out on a stretcher and allowed to spend many hours in the open air.

DIET.—The powers of digestion are much diminished, and it is not only useless, but harmful, to give food which will pass through into the intestine without undergoing the normal changes in the stomach, and may act as a direct irritant on the mucous membrane and at the same time undergo fermentation and decomposition, thus increasing the gas in the intestine and producing poisons which may be taken into the circulation. For

this reason even liquid nourishment should be given in limited quantity. Milk is altogether the best food, and should form the principal diet of typhoid patients. Lime-water, barley-water, and rice-water are sometimes added to prevent dense curdling in the stomach. Peptonized milk, koumiss, or matzoon may be given. From 3 to 5 pints of milk may be given daily. Clear soups, jellies, broths, and eggs—raw or soft boiled—may also be given. In occasional cases milk is not tolerated by patients, and other forms of nourishment may be substituted for it. Want of tolerance is often a fancy of the patient, and, when milk is perseveringly given, dislike to it ceases. Patients are, however, met with now and again with whom milk does not agree. For such, soups, jellies, barley-water, rice-water, fresh eggs, chicken-broth, mutton-broth, and coffee with much milk may be given.

The digestive functions seem less affected when the temperature is not high, and in mild cases many of these simple foods can be given without danger. Coffee or chocolate with a large proportion of milk is recommended by some in the early part of the day.

Literature of '97-'98-'99.

During twelve years, from 1886 to 1897, 380 cases of typhoid fever came under the writer's personal care. Of those from 1886 to 1893, 235 patients were treated under a milk diet, with a mortality of 10 per cent., and from 1893 to 1897, 147 cases were treated under a much more extended diet with a mortality of 8.1 per cent. In the latter series water was used more efficiently, but the extension of the diet did not prove injurious. "My plea is simply for treating the patient rather than the disease, for feeding him with reference to his digestive power, rather than solely or mainly with reference to his fever." The following typhoid diet given: 1.

Milk, hot or cold, with or without salt, diluted with lime-water, soda-water, Apollinaris, Vichy; peptogenic and peptonized milk; cream and water (*i.e.*, less albumin): milk with white of egg; slip buttermilk; koumiss; matzoon; milk-whey; milk with tea; coffee; cocoa. 2. Soups: beef, veal, chicken, tomato, potato, oyster, mutton, pea, bean, squash; carefully strained and thickened with rice (powdered), arrowroot, flour, milk or cream, egg, and barley. 3. Horlick's food, Mellin's food, malted milk, carni-peptone, bovine, and somatose. 4. Beef-juice. 5. Gruels: strained cornmeal, crackers, flour, barley-water, toast-water, albumin, and water with lemon-juice. 6. Ice-cream. 7. Eggs, soft-boiled or raw; eggnog. 8. Finely-minced lean beef; scraped beef. The soft part of raw oysters. Soft crackers with milk or broth. Soft puddings without raisins. Soft toast without crust. *Blanc-mange*, wine-jelly, apple-sauce, and macaroni. T. C. Shattuck (Jour. Amer. Med. Assoc., July 11, '97).

Coffee, tea, thin gruel, eggnog, clear soups, koumiss, and soft-boiled eggs are among the articles of food which should be permitted patients, even at the height of the disease. The urine of patients subjected to cold baths is greatly increased in toxicity, the kidneys being stimulated by the nervous system. Toxæmia is less common in these patients. Intestinal antiseptics may be added to the bath treatment. F. G. Finlay (Montreal Med. Jour., vol. xxviii, No. 2, p. 96, '99).

The return to solid food in the stage of convalescence must be made with care, especially when the attack has been severe. Boiled custards, eggs lightly boiled, eaten with a small piece of thin bread and butter, are to be permitted first.

Some authors state definitely that solid food should not be given until a week or ten days after the temperature has remained normal throughout each day. Such rules should not always be adhered to. There are cases in which a moderate

rise of temperature may exist for weeks, due largely to weakness, exhaustion, and want of elimination. The administration of solid food in small quantities will often relieve the exhaustion and enable the patient to gain sufficient strength to get out of bed. The writer is of the opinion that the general weakness from typhoid is unnecessarily prolonged in such cases by the withholding of solid food. The fact that patients frequently suffer from a relapse after taking solid food may be explained on the ground that in a certain proportion of cases typhoid fever is a relapsing disease, and that the latter may not be due to the change of diet.

Relaxation advocated of the strict dietetic rules usually followed in the direction of an earlier administration of solid food, especially meat, not only in convalescence, but in the acute stages of the disorder, the patient's appetite and general condition being taken as the guide to practice, and not the temperature-curve, as at present. Solid food not advocated in all stages and in all conditions of enteric fever, but great harm is frequently done and convalescence unduly lengthened by the prolonged periods through which patients are confined to an unnatural diet. *Barrs (Brit. Med. Jour., Apr. 4, '96).*

STIMULANTS.—Alcohol is given by some in a routine way in all cases. The practice should certainly be condemned. Alcohol, like other drugs, produces different effects on different persons, and it is not known how much digestion and assimilation may be interfered with, especially in patients who have been quite unaccustomed to its use. In the mild form of the disease alcohol is unnecessary, patients doing better without it.

In severe forms, especially when patients have been in the habit of drinking, also to old and feeble persons, alcohol

may be given in moderate quantities, commencing about the middle of the second week after the headache has subsided. When there is great prostration, this remedy is of positive benefit, when, for instance, the pulse is frequent and feeble and ataxic symptoms are present. It may be then given in from 8 to 12 ounces in twenty-four hours. It is doubtful if such large quantities as 1 ounce every hour is ever of any real benefit. There is too great a tendency to depend upon this agent to the neglect of other means of restoring the strength. Ether given subcutaneously will sometimes revive a patient temporarily. Alcohol may be given in the form of brandy or whisky, diluted with water, or in milk-punch. Wines, especially champagne, may be ordered when there is irritability of the stomach.

Medicinal Treatment.—A number of different remedies have been used as specifics; such, for instance, as iodine and calomel, as recommended by Liebermeister. Iodide of potassium, quinine, digitalis; coal-tar derivatives, turpentine and sulphurous acid; and sulphocarbolates have all had their advocates, and have, after a time, been discarded; some as simply useless and others as more or less dangerous. At the present time, in addition to the general management already detailed, cases of typhoid fever are, as a rule, treated according to one of four different methods:—

1. The expectant method, by which is meant the treating of symptoms as they arise and the guiding of the cases safely through the disease. This plan is to be recommended in mild cases when the temperature does not rise, as a rule, over 102° , and when the poison seems to exert little effect on the degeneration of tissues. It has, however, been abundantly proved by statistics that the expectant method is

inadequate for the successful treatment of severe forms of the disease, and that the mortality under its use is greater than that under some other modes of treatment.

2. The antiseptic method is based upon the fact that germs and toxins exist in the intestinal canal which may be taken up into the system and produce some of the serious muscular and nervous symptoms. In the later stages of typhoid fever the bacilli are found in large numbers in the bowel-contents, and it is probable that in some cases there may be a mixed infection and the colon bacilli may become more virulent than under ordinary circumstances. The antiseptics which have been the most generally used are bismuth, salicylates, betanaphthol, sulphurous acid; chlorine, as recommended by Yeo; salol, boric acid, and turpentine.

Guaiacol carbonate (*Med. and Surg. Bull.*; *Dom. Med. Jour.*, '97) is absolutely non-poisonous, 90 grains having been given without causing any symptoms of intoxication. Putrefactive processes alone render it absorbable, and it appears to be more thoroughly absorbed when given in small doses. It has no direct influence on the temperature.

Literature of '97-'98-'99.

Attention is called to the efficacy of chlorine in the treatment of typhoid fever. After four years of observation, the conclusions presented in a former paper are reiterated: 1. That in the treatment of typhoid fever chlorine can be safely administered until complete disinfection of the alimentary canal is obtained. 2. Under its use the tongue becomes cleaner, the appetite and digestion better, the fever lower, and the stools devoid of odor save that due to chlorine. 3. The general strength, intellectual processes, and nervous conditions improve. 4. The disease is shortened in duration and the patient usually

proceeds to a rapid and complete recovery. Wilcox (*Med. News*, Feb. 11, '99).

Many eminent authorities, Osler and Wilson among others, look upon intestinal antiseptics as useless.

Literature of '97-'98-'99.

The bowels should not be disturbed in the course of the disease. With the exception of a few doses of turpentine for tympanites, or measures directed against hæmorrhage or active diarrhœa, one should abstain from all active interference. Occasionally, for the constipation of convalescence, the writer gives castor-oil, but never the so-called intestinal antiseptics nor salts. Injections are preferred if the bowels are at all constipated, or the milk may be diluted and the amount of albumin-water increased. William Osler (*Phila. Med. Jour.*, Jan. 1, '98).

Wilson states that intestinal antiseptics, in so far as new pathogenic organisms are concerned, are directed against germs which do not exist in the bowel prior to the breaking through of the intestinal lymph-vessels, and are, therefore, largely inoperative. This may be quite true, but in the latter stages it would seem rational to render aseptic, if possible, the fluids which are in constant contact with the ulcerated surfaces and which contain both germs and toxins. If remedies can be given which do not affect the patient and which change the character of the passages from an ill-smelling liquid to one which has little or no odor, the effect cannot be other than beneficial.

3. The eliminative treatment, which is usually combined with the antiseptics just described, has been advocated by Bouchard in France and by many on this continent.

Thistle, of Toronto, introduced some five or six years ago a form in which

purgatives were more freely used than had been previously advocated, at least in late years.

In a more recent paper Thistle makes the statement that the adoption of the eliminative plan of treatment lowers the mortality of typhoid fever to a remarkable degree. It also lessens the severity of the symptoms and the duration of the fever.

Statistics of the Toronto General Hospital are given showing the number treated for four years from 1893-97 to have been 563, with a mortality of 6.57 per cent. The mortality for eight years including these four is over 10 per cent. During the four years a large number were treated on the elimination plan, some on the expectant plan, and perhaps a fifth by cold baths. Thistle has had so far under his observation 51 cases, with 1 death from pneumonia. He has collected 190 cases treated by physicians in the Province of Ontario, with 4 deaths: 2 from hæmorrhage, 1 from pneumonia, and in 1 the cause was not known.

Literature of '97-'98-'99.

A series of therapeutic experiments were made to determine the value of calomel in typhoid fever. In 71 cases calomel was given in a dose of $4\frac{1}{2}$ grains thrice daily, while, for the purpose of comparison, quinine was given in the same doses in 40 other cases. The patients in the first group continued to take the calomel till their evening temperature became normal; this result was obtained after a total amount of the drug varying from 2 to 5 drachms had been taken. Stomatitis never occurred, nor was diarrhœa aggravated. The disease in all these patients was mild in type, and often aborted. The fever abated more quickly, and the mortality (2.82 per cent.) was less than in the cases treated with quinine. No patient who was put on the calomel treatment, within the first week of the illness, died. Although calomel is not a specific, it is a

most useful remedy in typhoid fever. Andrievsky (Sem. Méd., Dec. 28, '98).

The Woodbridge treatment is similar to that of Thistle, the object being to render the contents of the bowel aseptic by free elimination. Whatever may be the theory upon which the eliminative treatment is founded, the writer, from personal observation, is satisfied on two points:—

1. That, in a number of cases, the temperature falls to normal or nearly so within twenty-four hours after free purgation is induced.

2. That cases at the end of the second or in the third week, when the patients are in a low toxæmic condition,—as shown by the dry, cracked tongue; sordes; low, muttering delirium; and meteorism,—have experienced decided and favorable change within twenty-four hours after free purgation. The writer is quite aware that such practice may possibly tend to the onset of hæmorrhage, but he considers the danger from the latter to be less than from the poisoned condition of the system.

Hydrotherapy.—The cold-bath treatment, as it is carried out in well-appointed hospitals, is probably the best form of treatment known, and if all patients could be treated in this way there would be little use of adopting any of the other known methods.

The remarkably-small mortality of three out of ninety-nine cases treated in the Johns Hopkins Hospital is an evidence of this. Every practitioner of experience knows, however, that many cases in private practice cannot be treated with cold baths. It is often impossible to induce patients to go to a hospital, and it is therefore necessary to treat them at home, even if the surroundings are unfavorable. Then, again, in country districts this method is, in many cases, quite

impossible. When an epidemic spreads over a large section the procurement of baths, nurses, etc., would be quite an impossibility. Some other method of treatment must, therefore, be devised, and the antiseptic method with moderate elimination has so far been the best.

It is, no doubt, true that the cold-bath treatment might be adopted in many private houses where it is not now used if the attending physician were more firm in its advocacy and had more faith in the great benefit of this mode of treatment.

Literature of '97-'98-'99.

[Dr. W. H. Thomson (Med. News, '97) gives the following treatment adopted in the Roosevelt Hospital. If a patient is admitted before the end of the second week of the fever, 5 grains of calomel and 35 grains of compound jalap-powder are administered on three successive nights. The calomel treatment is discontinued after the eighteenth day of the disease on account of the liability to hæmorrhage. Ten grains of saccharated pepsin with 10 grains of carbonate of bismuth are given every three hours to prevent tympanites and diarrhœa. If the latter persists, a double dose of bismuth is given. Whenever the tongue begins to be dry at the tip, 15 drops of oil of turpentine are given in emulsion every six hours. Moderate doses of strychnine and caffeine are sometimes given for cardiac debility, but never digitalis.

The cold bath is resorted to as soon as the temperature reaches 103°. The patient is actively rubbed in the bath and is taken out when the temperature falls to 101°. J. E. GRAHAM.]

Careful judgment is to be employed in giving the bath to children. Some do not bear the plunge at all well. There is, as a rule, at no period of childhood the need to use water at as low a temperature as in the case of adults. At the Children's Hospital of Philadelphia it is the custom to employ the graduated bath, placing the child in the tub with the water at a temperature of 95° and cooling it down to 85°, or occasionally,

with older children, to less than this. Very frequently, sponging answers every purpose. Even a tepid bath may sometimes answer well. Hydrotherapy is not to be used as an unalterable plan of treatment. J. P. C. Griffith (Phila. Med. Jour., Oct. 15, '98).

The cold-bath treatment of fever was employed by Curry, an English ship-surgeon, in the latter part of the last century, and it was first systematically introduced for the treatment of typhoid fever by Brandt, in 1861. I first saw the cold-bath treatment used in 1870, when it was adopted in the German army. This method is constantly growing in favor. It should not, however, be used for old and feeble persons or for those who have weak hearts or for excessively nervous individuals who struggle each time they are put into the bath. Baths are contraindicated if peritonitis or hæmorrhage is present. The following description of the method adopted in the Johns Hopkins Hospital has been kindly given to me by Dr. T. McCrae, who has had recently more immediate charge of the typhoid cases:—

The baths are given every three hours while the temperature is 102° or 102 $\frac{1}{2}$ ° or over. The interval is measured from the time the patient is put into the tub. The patient remains in the bath twenty minutes. The temperature of the first two or three baths is 80° or 85° and in a robust adult the subsequent baths are given at 70°. But in cases where that temperature is not well borne or when the patient is delicate or perhaps advanced in the disease before admission, the temperature may remain at 80° or 85°. There is no lowering of the temperature by ice. The patient is placed in the bath and no further attention is paid to the temperature of the water. A bath with reduction of temperature—say, from 95 to 80—is rarely given, and only

in special cases. The temperature of the bath for children is generally 80, and they are left in from ten to fifteen minutes.

PREPARATION. — The night-dress and bedclothes are removed under a sheet by which the patient remains covered. If he is sweating, he is rubbed dry. The bath-tub is filled outside of the ward to within six or eight inches of the top.

Canvas strips are used to support the patient in the tub. These are thirty-six inches long and of a width varying from eighteen to thirty inches. They are fastened across the tub to the edges of the bath by clamps which are easily removed. The canvas strips are placed so as to form a sort of trough in which the patient lies. Their exact arrangement has to be made after the patient is in the tub. The strip at the head of the tub may be clamped all around the end so as to form a support. Two persons lift the patient covered by the sheet into the bath. The attendant lifting the head slips his hands under the shoulder, and puts the patient's head in the hollow of the arm farthest away from the bath. A second attendant takes the feet, and the patient is directed to hold himself stiff when he is lifted into the tub and lowered gently into the water. The sheet is used as a covering. The strips should be so fixed that the water just covers the patient's chest. The head should be supported on a ring or air pillow. The patient is rubbed regularly, constantly, and systematically either with a bare hand, a rubber, or a mitten made of lint. The strength used depends on the feelings of the patient, and special attention should be paid to the hands and feet. The rubbing should be continued during the whole time of the bath. A cloth rung out in ice-water is placed on the patient's head before he is put into

the bath-tub and should be frequently changed. If pronounced nervous symptoms or high fever are present ice-water is sponged freely over the head whenever the cloth is changed. The bed is prepared before the end of the bath as follows: Over the lower sheet a mackintosh is spread, and on this is put a linen sheet. At the end of the bath the patient is lifted back into bed, a dry sheet is held over the bath and beneath it the wet one is pulled to one side of the patient. He is lifted up as before, held to drip for an instant, and lifted into bed. The sheet is tucked around him, as is also the one that was previously put on the mackintosh sheet. Generally a blanket is put over these; some patients like two blankets. The patient is left in the wet sheets ten minutes, after which he is rubbed dry, the sheets and mackintosh are removed, and the night-dress and bedclothes are replaced. The temperature is taken one-half hour later. This is called the after-bath temperature, and is recorded. Nourishment is never given in the bath, but usually immediately afterward. Alcohol is not given as a routine practice with the baths. Many cases—in fact, the majority—go through without any. It is frequently ordered only with the baths, and then it may be given either before or after. If alcohol is being regularly administered,—say, every three hours,—it is generally given at bath-time.

The patient is removed at once from the bath if any of the following conditions appear: Extreme distress, dyspnoea, cyanosis, vomiting, or convulsions. There is no routine method; every case has a special order as to bath-time, etc.

A description of the method of giving the baths at the Toronto General Hospital has been kindly furnished me by Mr. Tanner. The details are the same as

those already given in almost every particular, except that the water which is at 85 when the patient is placed in the bath is cooled down to 70 by means of ice.

This method of treatment should be commenced as early as possible when the temperature reaches 102.5°. The number of baths given depends on the temperature of the patients. When the baths are given before the fifth day, the mortality is very light, and J. C. Wilson, who has had a very large experience in this method of treatment, found that, in a series of 132 consecutive cases treated before the fifth day, the mortality was about 3.4 per cent.; in those between the fifth and tenth day, 7.7 per cent.; and in those after the tenth day, 22 per cent. In the latter cases the mortality would, under any circumstances, be high, because the early treatment would probably have been injudicious, and the removal from one place to another is always dangerous in advanced cases. Wilson gives the baths when intercurrent diseases, such as bronchitis and pneumonia, are present. Menstruation and pregnancy do not contra-indicate the use of baths. The mortality in 524 cases under Wilson in the German Hospital up to January, 1896, treated by cold bathing was 7.25 per cent. In the Johns Hopkins Hospital 652 cases were treated under Osler's directions up to January 1, 1898, according to Brandt's system, with a mortality of 7.1 per cent. Perforation and hæmorrhage are not increased by bathing, but there is a greater number of relapses.

The benefits arising from cold baths are due to the reduction of temperature, the improved condition of the nervous system, and the more rapid elimination of toxins by the urine.

Résumé of 1211 cases of typhoid published, in all of which cold baths were used from the beginning. There were 12 deaths: that is, about 1 per cent. From

these 12 fatal cases 2 should be eliminated, in 1 of them the treatment having been suspended upon the sixteenth day on account of arthritis, and the other terminating fatally from some unknown cause. Paul Chéron (*L'Union Méd.*, May 24, '88).

Literature of '97-'98-'99.

[The mortality of typhoid cases in Chickamauga Park, treated according to the Brandt system, was 6.25 per cent. (*Phila. Med. Jour.*, Sept., '98). J. E. GRAHAM.]

A good deal depends upon the time when the treatment is begun. Of 32 cases treated before the fifth day there was a loss of but 1, or 3.4 per cent.; of 78 treated before the tenth day there was a loss of 6, or 7.7 per cent.; 18 cases receiving the treatment after the tenth day, there was a loss of 4, or 22 per cent. James T. Whittaker (*N. Y. Med. Jour.*, Jan. 14, '99).

Death from perforation and hæmorrhage is more frequent under the Brandt than under other methods of treatment. Relapses, however, are not more frequent under the Brandt treatment. Of 408 personal cases relapses occurred in about 8 per cent. Hæmorrhage was the cause of death in three. Stewart (*Montreal Med. Jour.*, Feb., '99).

Treatment of Special Symptoms.—Patients suffering from a mild form of the disease without complications do not need any special medication, and care should always be taken that the stomach is not deranged by drugs unnecessarily given.

The headache in the first week is best relieved by phenacetin in from 3- to 5-grain doses. The smaller doses are often quite sufficient. Sodium bromide may be given alone or with aromatic spirit of ammonia. The application of the cold-water coil or ice-bags to the head have often a good effect. A dose of calomel followed by a saline will sometimes relieve a headache.

In the early stages sleeplessness is relieved by the administration of trional or

sulphonal. In the latter part of the disease opium is altogether the best remedy, and may be given in the form of Dover's powders. Opium has a tendency to prevent elimination, and is, on that account, objectionable. The other nervous symptoms, coma vigil, subsultus, etc., do not often occur in those cases treated by cold bathing. In the adynamic condition, stimulants are especially necessary, and should be given freely. Wilson recommends the administration of hypodermics of ether in 10-minim doses, repeated once or twice at intervals of several hours. He also speaks highly of Siberian musk in nervous depression. It may be given in pill form or in suppositories, 5 to 10 grains to the dose. Valerian and asafoetida are useful when the delirium is of an hysterical character.

Dryness and coating of the tongue and lips may be much relieved by first washing the mouth with a solution of boric acid, followed by the use of honey and borax, if there are any abrasions or ulcers. A very mild solution of potassium permanganate is sometimes used as a mouth-wash. Vomiting may be relieved by the application of mustard over the epigastrium. Bismuth and oxalate of cerium, diluted hydrochloric acid, and cocaine hydrochlorates have been recommended. Aërated water, champagne, and brandy and ice have been given. Attention should be paid to the quantity and character of the food.

Tympanites, when moderate in degree, does not need any special treatment; when excessive the diet should be reduced in quantity, if necessary. Turpentine stupes may be applied. Turpentine, salol, and betanaphthol, with salicylate of bismuth, may be given. The use of a rectal tube will give relief if the gas is in the large intestine.

If the meteorism is so great as to be

really dangerous to life, rectal injections of a solution of sulphate of magnesia may be given. Puncture through the abdominal wall is not advisable in any case.

Flushing of the colon advocated: from 1 to 3 quarts of cold water can be easily and safely passed into the colon, which will rapidly lower a high temperature. Tympanitic distension always disappears with the passing away of the water so injected. Buchman (*Med. Record*, Sept. 28, '89).

Constipation is present in a certain proportion of cases, and, if they are of a mild type, it is probably not harmful. The bowels should be kept free by the administration of salines, castor-oil, or olive-oil: remedies which do not materially increase the peristaltic action of the bowels. If constipation exists in the second or third week, with evidence of severe typhoid poisoning, it is my opinion that the administration of a saline is less dangerous than to allow this condition to continue. It must be stated that men of large experience—Wilson, for instance—advise against the administration of laxative drugs after the middle of the second week. He is also of the opinion that large enemata, especially when given with energy, are not free from danger.

Diarrhœa, unless excessive, does not require any special treatment. It is sometimes the result of local irritation from hard masses and irritating fluids, and a mild cathartic, by expelling these, will cause the diarrhœa to cease. If it still continues, the writer has found opium and acetate of lead the best remedies.

INTESTINAL HÆMORRHAGE. — When symptoms of hæmorrhage appear, the patient should be kept quiet; the foot of the bed may be raised to prevent fainting, and blood which is passed through the bowels should be removed

with as little disturbance as possible. All stimulants should be forbidden. Nervousness on the part of the patient will excite the heart and thus tend to increase the hæmorrhage. An ice-bag may be placed on the right iliac fossa. Opium is the best internal remedy, for, while it lessens the peristaltic action of the bowels, it also quiets the patients. Turpentine is thought by some to be especially valuable. Intestinal antiseptics, by reducing tympanites, are of use in hæmorrhage. Normal salt solutions in amounts of from 4 to 6 ounces, may be injected into the subcutaneous areolar tissue. Transfusion of blood is a difficult operation, and in the writer's experience has not been of much value.

The food should be given in small quantities and stimulants avoided. The bowels should be kept quiet for six or eight days. According to Lauder Brunton, lime-water given during the course of the disease may prevent intestinal hæmorrhage.

PERFORATION.—This very grave lesion has not been so far treated with much success. A low septic peritonitis usually follows, which is quickly fatal. The usual treatment is complete rest and the administration of opium or morphine hypodermically. Ice may be given for the dryness of the throat, and all food should, for a time, be withdrawn. If an early diagnosis is made, surgical interference is indicated. This procedure is warranted by the success which has so far attended early operative measures. (See STOMACH AND INTESTINES, SURGERY OF, this volume.)

The early diagnosis of perforation has, in one or two cases, been confirmed by making a blood-count and finding a great increase in the leucocytes. Unfortunately, rupture may take place without increased leucocytosis, and the latter

condition may arise from other local inflammations when there is no perforation. The operation should be performed as early as possible after the symptoms of shock have passed away. Keen states that the second twelve hours after the accident have been shown by statistics to be the most favorable time. The following statistics, taken from Keen's "Surgical Complications and Sequelæ of Typhoid Fever," show the danger of delay in this operation:—

	Cases.	Recoveries.
Within twelve hours.....	15	4
Twelve to twenty-four hours..	20	6
1 to 2 days.....	13	1
2 to 3 days.....	6	2
3 to 4 days.....	4	0
5 days.....	1	0
38 days.....	1	0

Keen states that if the operation is not done within about twenty-four hours after the accident there is practically no hope of recovery.

Literature of '97-'98-'99.

The advantage of early operation in typhoid perforation is well illustrated by the following statistics. Of 17 cases operated on within 12 hours, 4, or 23.5 per cent., recovered; of 26 cases operated on between 12 and 24 hours, 9, or 34.6 per cent., recovered; of 14 cases operated on between 24 and 48 hours, 1, or 7.1 per cent., recovered; of 6 cases operated on between 2 and 3 days, 6, or 33.3 recovered; of 4 cases operated on between 3 and 4 days, none recovered; 1 case, operated on after 5 days, succumbed; one case, operated on after 35 days succumbed. It is advised to defer the operation until the primary shock, which, as a rule, lasts for a few hours, has somewhat passed off. Platt (*Lancet*, Feb. 25, '99, p. 505).

Epistaxis, as a rule, requires no special treatment. The application of ice to the nose or the use of a weak solution of

tincture of iron will often be sufficient. It is occasionally necessary to plug the posterior nares. Styptics, such as gallic acid and tannic acid, are of doubtful value when given internally, and may derange the stomach. The lungs should be frequently examined to ascertain the presence of bronchitis or pneumonia. Hypostatic congestion may, to some extent, be prevented by changing the position of the patient every few hours. The presence of pneumonia should not deter the physician from pursuing the ordinary course of the treatment of the fever. Expectorants containing ammonium chloride may be given for the bronchitis.

The heart should be frequently examined, and, if it is weak, tonics, such as strychnine and caffeine, may be given. The nitrites, especially amyl-nitrite, have been recommended by Wilson. In cases of cardiac weakness care should be taken that the patient does not sit up or make sudden movements in bed.

The retention of urine is a not infrequent complication, and when the patient is very weak the physician should carefully examine the abdomen for distended bladder. A soft-rubber catheter should be used, and the greatest care taken by thorough cleanliness to prevent the introduction of germs into the bladder. Immediately before the use of the catheter the part should be washed with a bichloride solution, 1 to 2000.

A continuously-high temperature is very injurious to the patient. If cold baths cannot be given, cold sponging, cold compresses, Leiter's coil, or the ice-bag may be used.

Antipyretics—such as antipyrine, antifebrin, and guaiacol—are to be condemned. The writer has seen two cases in which very alarming symptoms followed the taking of a 15-grain dose of antifebrin. Both patients had been

strong and healthy persons previous to the onset of the fever.

TREATMENT BY INOCULATION.—Within the last few years attempts have been made to shorten the course of typhoid by subcutaneous injections of sterilized liquid from the cultures of typhoid bacilli.

Fraenkel and Manchot ("Amer. System of Med.," vol. ii, p. 229) used a sterilized liquid from the culture of typhoid bacilli in bouillon made from the thymus of the calf and heated to 60°. The injections were made deeply into the muscles of the buttock. The first injection—0.5 cubic centimetre of the sterilized liquid—was not followed by any reaction except in children. On the following day a second injection of 1 cubic centimetre was made, which was followed, in the majority of cases, by rise of temperature and chilly sensations. After six or seven hours the temperature fell and rose again in those cases in which the treatment was discontinued. Fraenkel gave the injection every second day, increasing the dose by 1 cubic centimetre each time. The temperature showed decided remissions. The constitutional symptoms were less marked, and complete absence of fever resulted in the course of a few days. Fifty-seven cases were treated in this way.

Rumpf publishes the results of the treatment of thirty cases with a sterilized culture of the bacillus pyocyaneum obtained from thymus bouillon. Favorable symptoms followed its use.

Beumer and Peiper employed 1-per-cent-pepton bouillon as a culture-medium, and destroyed the bacilli by exposure to a temperature between 55° and 60° C. for an hour. Longer exposure or a higher temperature decidedly decreased the virulence of the culture. Sheep were inoculated with these cultures at inter-

vals, the amount injected being gradually increased from 1 to 100 cubic centimetres. The animals were then bled, and the serum treated with 0.5-per-cent. solution of carbolic acid and preserved in a dark place. The serum was found to possess both immunizing and curative properties. No dangerous effects followed the injection in healthy men, but further experimentation is necessary to establish its immunizing and curative effect on human beings.

Convalescence. — Patients should not be allowed to get out of bed until they are sufficiently strong to make the change with safety. I have always allowed patients to sit up and to move about in bed, two or three days previous to their sitting in a chair. The dressing of patients often produces more fatigue than sitting up, and a dressing gown only should be allowed at first. In some the strength returns very slowly, and a recrudescence, with slight elevation of temperature lasting two or three days, is not unusual. Strychnine, iron, and arsenic are indicated in cases of anæmia and cardiac asthenia.

It is not necessary to cut the hair short in typhoid fever, but when the system of cold bathing is adopted it is more convenient to do so. Peripheral neuritis, producing paraplegia, is treated by tonics, local massage, and the use of galvanic and faradic currents. Typhoid spine, which has been alluded to, is best treated by supporting measures and the local use of the thermocautery.

Thrombosis of the veins of the leg is often a troublesome sequel of typhoid fever. The patient should remain in bed until the local pain and swelling have disappeared. Iodine may be applied over the affected veins. In many cases careful bandaging is necessary after the patient gets up.

Literature of '97-'98-'99.

Case of phlegmasia dolens in typhoid should be treated by elevation of the leg; application of compresses wet with lead-and-opium lotion, or witch-hazel distillate; laxatives, in constipation; in persistent pain, belladonna plaster strips along the veins; absolute rest in bed; continued mechanical support of bandages, etc., after the patient gets out of bed, until the veins recover their tone and all symptoms of obstruction are past. Massage should be avoided as long as there are signs of venous disturbance. J. M. Da Costa (Boston Med. and Surg. Jour., Mar. 23, '99).

JAMES E. GRAHAM,
Toronto.

TYPHUS FEVER.

Synonyms. — Typhus gravior; camp-fever; ship-fever; spotted fever; exanthematous fever.

Definition. — An acute infectious febrile disease, commencing abruptly, continuous in type, reaching its crisis in about two weeks, accompanied by maculated or petechial spots on the surface and prominent nervous symptoms.

Symptoms. — The period of incubation is between seven and fourteen days, at the end of which time the patient is attacked rather abruptly with pains in the head, back, and limbs, accompanied by a decided chill or alternations of heat and cold, which soon give place to decided fever-heat. The face becomes flushed, the skin generally dry and red, the vessels of the conjunctiva injected, and the temperature high. The tongue is usually covered with a white coat, the mouth dry, pulse frequent and moderately full, bowels inactive, and urine high colored and less abundant than natural. There is much restlessness and sense of prostration, or mental dullness with indications of delirium. All the symptoms usually increase during the first week, reaching their climax in from

five to seven days. The temperature advances with but little or no morning remissions from 103° F. on the first day to 104° or 106° F. on the fifth or sixth day, after which it recedes one or two degrees each morning, but returns to the higher grade in the afternoon and evening.

During the same period of time the tongue becomes more thickly covered with a dry, brown coat, some sordes appear on the lips and teeth; the pulse increases in frequency, often reaching 120 to 130 per minute, though less full. The respiratory movements increase in frequency, with less fullness, and a dry, congested condition of the mucous membrane of the air-passages is generally present, and in the later stage more or less hypostatic engorgement of the lungs. In a large majority of cases a rash appears on the skin between the third and fifth days of the disease, first over the abdomen and upper part of the chest, then, in two or three days, it extends to the face, neck, and extremities. Many of the spots present a dull-red color and appear as though beneath the cuticle. Other spots are more papular, and in severe cases they become petechial or hæmorrhagic and only partially disappear on pressure. In mild cases the eruption is generally slight, and in some altogether absent. In a few severe cases paroxysms of vomiting and diarrhœa have occurred early in the progress of the disease, but, as a general rule, the stomach and bowels are inactive and the abdomen free from gurgling and tympanites.

In the most severe class of cases the patient becomes early and persistently delirious, the vessels of the conjunctiva are injected, the pupils small, the tongue dry and brown with sordes on the teeth and lips, the skin hot and dry. A copi-

ous eruption of petechial or hæmorrhagic spots appears, the temperature rises to 105.8° or 107.6° F., the pulse to 140 per minute and weak, the cardiac impulse and first sound are weak, respirations frequent and shallow with rapidly increasing hypostatic engorgement of the lungs. The urine scanty and albuminous. Sub-sultus tendinum is marked. Such cases generally terminate fatally before the end of the first week. In a larger number of fatal cases these unfavorable symptoms develop more slowly and do not end in death until the end of the second week or the first half of the third. When the patient is progressing toward recovery the patient's mental condition is more that of dullness and light delirium, from which he can be more readily aroused especially during the morning hours, when the temperature is a little lower and the pulse less frequent, and the renal secretion more natural. Such cases reach the crisis about the end of the second week, when the patient falls into a more protracted and natural sleep, from which he awakes with his mind clear, skin moist, urine free. After one or two evacuations from the bowels, rapid defervescence follows, and in two or three days convalescence is fully established, though accompanied by great prostration.

While it is true that typhus fever is not usually accompanied by active gastro-intestinal irritation, yet exceptional cases occur during almost every epidemic characterized by active diarrhœa and vomiting. On the other hand, cases are occasionally met with in which constipation requiring the use of laxatives persists throughout the whole course of the disease. Such cases are generally characterized by much delirium or stupor and subsultus.

Diagnosis.—The diseases with which

typhus fever has been most frequently confounded are typhoid, or enteric fever; cerebro-spinal, or spotted fever; malignant rubeola, and some cases of acute miliary tuberculosis. The fact that, through all the centuries prior to about the middle of the present, all cases of what are recognized now as typhoid and typhus fevers were regarded as only varieties of one type of continued fever is sufficient evidence of a close similarity in the clinical phenomena presented by them. The chief clinical diagnostic features are that in typhus the prodromic stage is short; the chill or cold stage is more marked, followed by a more rapid rise of temperature without morning remissions during the first week, and a more marked crisis near the end of the second week. The pulse is more frequent; the pains more severe in the first stage. There is more delirium, stupor, and subsultus, with but little or no diarrhœa or abdominal tympanitis. Much diagnostic importance has been attached to the character of the eruption, which, in typhus, generally appears on the abdomen and chest between the third and fifth days of the fever, and is papular or petechial in form, much resembling the eruption of measles. It does not entirely disappear under pressure, extends in many cases to the neck, face, and extremities, and in severe cases becomes hæmorrhagic. It differs from the eruption in measles by appearing on the abdomen and chest first instead of the face and neck, and by the absence of the catarrhal symptoms so prominent in measles.

The characteristic eruption appears in typhoid fever in the form of rose-colored lenticular spots, from which the color wholly disappears by pressure and is not distinctly papular in any stage of its progress. The diagnostic value of the

eruptions in these fevers is much lessened from the fact that in many cases of typhus an eruption of dark-red or purplish spots appear in advance of, or interspersed with, the more papular clusters, and in rare cases impart to the surface an erythematous appearance. It is these maculæ that most resemble the eruptions in cases of cerebro-spinal fever. In many cases the eruptions are so intermingled as to leave the most experienced observers in doubt as to the true diagnosis during the whole progress of the disease. [See cases recorded in "Clinical Reports on Continued Fever," by Dr. Austin Flint, 1852; and by Dr. J. M. Da Costa in *American Journal of Medical Sciences*, p. 1, July, 1899.] Again, not a few cases, especially of the milder class, have been met with in which no eruptions of any kind were observed. MM. Louis and Chomel and their followers endeavored to found the diagnosis between typhoid and typhus fevers largely on the abdominal symptoms and pathological changes in the glands of Peyer and the mesentery. The presence of tympanites and gurgling on pressure with liquid stools was regarded as strongly indicative of typhoid; and in fatal cases if the post-mortem revealed tumefaction and ulceration of Peyer's glands in the intestine and enlargement of the spleen and mesenteric glands the diagnosis was regarded as complete. The recently discovered Widal reaction, or serum-agglutination test, was at first thought to be peculiar to the blood-serum of typhoid fever, and therefore valuable in differentiating that disease from typhus and other forms of fever. Further investigations, however, have shown the presence of that reaction in the blood of typhus, yellow fever, and the plague, while it can be obtained in typhoid cases often only after the first

week, and in the most severe cases not at all. It is perhaps valuable as indicating the beginning of immunity, and therefore prognostic in its import.

Etiology.—Typhus fever is very generally regarded as a highly contagious affection. But, up to the present time, neither the chemist nor the bacteriologist has been able to identify any specific toxic agent as the essential cause of the disease. Its whole previous history has shown it to be closely connected with populations living in overcrowded, uncleanly, and ill-ventilated houses, camps, prisons, almshouses, and ships, and with insufficient food. Some of the most extensive and destructive epidemics of the disease have followed directly in the wake of famine. This is well illustrated by the history of its prevalence in Ireland and in the countries bordering on the Baltic sea. During the middle part of the present century, when many thousands of immigrants to this country from Ireland and other parts of Europe were crowding almost every sailing vessel that crossed the Atlantic, typhus fever was so prevalent among them that it became generally known as "*ship-fever*," and so filled the quarantine and emigrant hospitals in New York and Boston as to greatly increase the ratio of mortality. But the subsequent rapid and almost complete transference of all immigrant and other passenger traffic from the slow sailing vessels to the fast moving ocean steamships has resulted in nearly banishing the "*ship-typhus*" from the ocean as well as from our important sea-port towns. This change in the ocean travel coincident with extensive improvements in the sanitary condition of most of the great centres of population, both in this country and Europe, has rendered typhus comparatively a rare disease during the last twenty-five years.

Pathology.—The assemblage of morbid phenomena constituting typhus fever may be said to consist of diminished sensibility and activity of the nervous structures both voluntary and involuntary, with lessened muscular action; diminished oxygenation of the blood, with imperfect coagulation and impaired condition of red corpuscles; general diminution of secretions, with increase of urea and diminution of phosphates and frequently the presence of albumin in the urine; dark color of blood and tissues, with progressive granular degeneration of the cardiac and muscular structures generally, with enlargement and softening of the spleen, kidneys, and liver, congestion of the mucous membrane of the air-passages, and hypostatic engorgement of lung-tissue. Such an assemblage of phenomena, all in the direction of impairment of both function and structure, implies the presence of some virulent sedative ptomaine, leucomaine, or toxalbumin, or the absence of sufficient oxygen or other agent essential for the maintenance of the vital properties of the cell-protoplasm entering into the composition of the blood and tissues of the body. In the more severe cases these universal changes progress with such rapidity that the heart fails to contract with sufficient force to maintain circulation of the blood, and the patient dies before the end of the first week from general suspension of the phenomena of life. In cases of less severity the same changes take place less rapidly, and fatal exhaustion is not reached until the end of the second week; while cases still milder reach a crisis in about two weeks, when critical evacuations from the skin, kidneys, or bowels occur, and convalescence ensues.

Prognosis.—From statistics gathered in the leading hospitals of London, Edin-

burgh, Glasgow, and Paris by Dr. Murchison the average ratio of mortality from typhus was stated to be 18.8 per cent., or a little less than one in five. The ratio varies much in different epidemics. According to Dr. Murchison, the ratio of deaths in the London Fever Hospital in 1850 was 60 per cent., and in Bellevue Hospital, New York, in 1869, it was nearly 20 per cent. In other epidemic seasons it has ranged as low as 8 or 9 per cent. The majority of systematic writers state the mortality-ratio as between 12 and 20 per cent.

In children the death-rate is much lower than in adults, and is greatest in old age. Many recorded facts show that the ratio of mortality in any epidemic of typhus fever is much influenced by the amount of fresh air supplied to the patients. A patient occupying a large, clean, and well-ventilated room or tent, not only has greatly increased chances of recovery, but he very rarely communicates the disease to others who may come in contact with him. This was well illustrated when in 1864 the fever patients were removed from the crowded wards of Bellevue Hospital to tents on Blackwell's Island. In the hospital the death-rate had been from 18 to 20 per cent., and several of the nurses and house physicians had died; but after their removal to the tents with abundance of fresh air and little or no use of alcoholic remedies, the death-rate diminished to between 5 and 6 per cent., and the nurses and medical attendants remained unattacked.

Prophylaxis.—The most important measures for preventing the development and spread of typhus are the maintenance of free ventilation, strict cleanliness, wholesome food, pure water, prevention of aggregating of many patients in one room or ward, and the exclusion

of all but the necessary physicians and nurses.

Treatment.—In the absence of all knowledge concerning the specific germ or other toxic agent on which the development of typhus fever depends, our treatment must be founded on the indications presented by a careful study of the clinical phenomena of each case, and the known tendency to general granular or cell-degeneration in the various structures of the body. The first and most imperative indication is to secure for the patient an abundance of good fresh air and the enforcement of strict cleanliness of person, clothing, and room, and a judicious supply of pure water and liquid nourishment. The second indication is to repress the rapidly rising temperature of the first stage by frequent sponging or bathing of the surface with cool water, and to promote the natural secretions and eliminations from the skin, kidneys, and abdominal viscera generally, and thereby prevent the accumulation of waste and toxic products in the blood and tissues of the body. The third, is to sustain the cardiac, respiratory, and vasomotor nerve-functions, and to preserve the integrity of the corpuscular elements of the blood and tissue through the second week and until convalescence is fully established. In fulfilling the first of these indications, in addition to the constant supply of fresh air and the maintenance of strict cleanliness, including the prompt removal from the room of all evacuations, careful attention should be given to the ingesta—food and drink. The best and only drink proper should be good, cool water given in small quantity at once, but repeated often enough to help in keeping the mouth moist and in encouraging the natural excretions, without overloading the stomach. For nourishment, good fresh

milk containing 1 ounce of fresh lime-water to 6 ounces of the milk, given in doses of 1 or 2 ounces every two or three hours until the fever reaches its climax from the third to the fifth day, after which it may be moderately increased and often supplemented by 2 or 3 ounces of beef- or mutton- broth salted as much as a well person would relish, given between the doses of the milk. If diarrhœa supervenes during the middle or later stage of the disease, a properly prepared thin wheat-flour and milk-gruel or porridge may take the place of the milk and lime-water with advantage.

In fulfilling the second indication, in addition to judicious and efficient bathing, packing, or sponging with cool water sufficient to moderate the high fever, heat, and promote natural metabolism and excretion, these effects may be further promoted by giving 1 or 2 grains of calomel every two hours until the bowels are moved by it, which will generally be within the first twenty-four hours, and during the same time a mixture of equal parts of liquor ammon. acetatis and spt. of nitrous ether may be given between the doses of the calomel. This may be continued after the operation of the calomel with the addition to each dose of 2 or 3 minims of the tincture of aconite-root so long as the skin remains hot and dry and the pulse firm under pressure. If the small doses of calomel fail to move the bowels within the first twenty-four hours they may be aided by a full rectal enema of warm water holding in solution 2 drachms of chloride of sodium (common salt), which will generally be followed by free evacuations of both fœces and urine.

If the patient passes beyond the first week without excessive delirium or profound stupor, with a temperature not above 104° F. and a pulse not above 120

per minute, little else is required besides a faithful continuance of the hygienic measures already indicated, with the aid of mild diaphoretics and an occasional enema of warm water and salt when needed, and the patient will pass the crisis near the end of the second week in safety. But if at any time after the first five days of the attack the pulse becomes softer and more frequent, with less force and steadiness of cardiac systole, less depth of inspiration with less resonance over the lower and posterior parts of the lungs, and increasing stupor or muttering delirium, the aconite and diaphoretic mixtures should give place to efficient doses of strychnine in solution with nitric or nitromuriatic acid every four hours, and half-way between 10 grains of hyposulphite of sodium and 5 minims of tincture of belladonna in solution in mint-water. There is, probably, no other remedy known to the profession that is more reliable for maintaining the sensibility and action of the respiratory, cardiac, and vasomotor nerve-centres and ganglia than strychnine given in solution with a mineral acid, especially in the advanced stages of typhus and typhoid fevers. And I know of no more efficient antiseptic or antidote for the toxæmic agents pervading the blood and tissues of such patients than efficient doses of the hyposulphite of sodium.

If, as occasionally happens, the bowels become too loose, the hyposulphite should immediately give place to an emulsion of oil of turpentine and oil of wintergreen, to each dose of which from 5 to 10 minims of tincture of opium may be added. On the other hand, cases are sometimes met with presenting an anxious expression of countenance, very frequent pulse, and continued insomnia or sleeplessness, in which a powder com-

posed of Dover's powder, 10 grains; pulverized gum camphor, 2 grains; and calomel, $1\frac{1}{2}$ grains, given in the evening, will produce several hours of natural sleep followed by decided improvement in the condition of the patient. When the stage of convalescence is reached, no other treatment is required except to insist on the continuance of rest, good air, and easily digestible food, until a fair degree of nutrition and strength has been regained.

But little has appeared concerning the treatment of typhus fever in the current medical literature of the last two or three years. Legrain [see *Gaz. des Hôpitaux*, July 4, '95] reports having treated a few cases with the serum from convalescent patients, in the form of injections, but without decisive results.

N. S. DAVIS,

Chicago.

U

URÆMIA.—Uræmia is the term which is applied to a group of nervous symptoms supposed to be produced by the retention in the blood of excrementitious substances normally excreted by the kidneys, or when there is interference with the secretion or the discharge of the urine. It is met with in Bright's and other disease of the kidneys (cancer, tubercle, suppuration, etc.), and in cases of anuria, obstructive or non-obstructive, in pregnancy and in parturition.

Symptoms.—All the nervous functions may be involved in uræmia. The principal cerebral and mental derangements are drowsiness, stupor, coma, and delirium. The most common disorders of the sensory functions are pain, especially in the head, sometimes very persistent and intense; dimness of sight, or actual blindness of one or both eyes, sometimes attended by albuminuric retinitis or in some cases without retinal lesion; tinnitus aurium, and sometimes deafness. Among the disorders of the motor functions, the most important are involuntary muscular twitchings or general convulsions; the tendency to vomiting; and not infrequently extreme dyspnœa. By close observation we distinguish two forms of uræmia: the *acute* and the *chronic*.

ACUTE URÆMIA includes all the varieties in which the symptoms develop suddenly. Acute uræmia occurs not only with the different forms of nephritis, but also with angina pectoris, pulmonary emphysema, and chronic endarteritis. Three forms are commonly recognized: the comatose, the convulsive, and the mixed; less frequently met with are the delirious, dyspnœic, ocular, and articular.

In the acute comatose form coma rapidly develops, after the appearance of headache, giddiness, more or less disturbance of vision, vomiting, or delirious excitement; or it may be unattended by premonitory symptoms. The face is usually pale; the pupils react slowly to light and are dilated or unaltered; in other cases we may observe a red spot on the cheek, injected conjunctivæ, and contracted pupils. There is a peculiar, stertorous breathing—not the deep snoring observed in hæmorrhagic apoplexy, but a sharper, more hissing sound, produced by the rush of expired air on the hard palate or teeth (T. Grainger Stewart). Death may occur in a few hours from a rapid deepening of the coma; or the patient may recover and continue permanently free from the symptoms; or uræmia may recur, sooner or later, in

one of its many forms and death follow. Acute uræmic coma may occur in any of the various forms of Bright's disease, but is most frequent in the cirrhotic and inflammatory varieties.

The *acute convulsive* form may be marked by symptoms almost exactly simulating those of epilepsy; or may not be attended by loss of consciousness; or may be confined to certain groups of muscles, and thus simulate tetanus. The attack is sudden, with or without warning. It may be a single attack, or a rapid succession of attacks may occur: five or six, or even more, in the course of twelve hours. These attacks may prove rapidly fatal, either during the paroxysm, or in the coma which succeeds it; or they may be recovered from. Convulsive attacks may occur in any of the various forms of Bright's disease, but most frequently in the cirrhotic and inflammatory varieties; they may, indeed, be the first warning of the existence of cirrhosis of the kidney.

The other forms mentioned (mixed, delirious, dyspnœic, etc.) need no detailed description.

CHRONIC URÆMIA usually develops gradually, and may not be recognized at once, although the pathognomonic listlessness and indifference of manner in cases of Bright's disease becomes somewhat more marked. The movements become slower, and speech is somewhat indistinct. Dimness of vision, tinnitus aurium, and uneasy feeling in the head or, mayhaps, violent and persistent headache may be present. The symptoms occasionally improve or disappear, but they uniformly recur, and gradually become more intense. The drowsiness passes into stupor. When the patient is roused to speak, articulation is at first thick and indistinct, and, later, the patient cannot be made to respond; stupor deepens into coma; the breathing assumes that char-

acteristic stertor before mentioned; and death ensues. Exceptionally, the patients may suffer from a noisy delirium, in which prolonged howling alternates with muttering or with paroxysms of excitement; there may be low prolonged muttering, with a repetition of the same word or phrase. Subsultus tendinum and twitching of the facial muscles are commonly seen throughout. Convulsions, diarrhœa, and vomiting are frequently present. Epistaxis may occur, but is rare. In chronic uræmia, says Delafield, the convulsions, sudden coma, dyspnœa, high temperature, aphasia, hemiplegia, and contractions of the arteries are absent. The action of the heart and pulse are feeble. The patients pass into a condition of great prostration, with alternating delirium and stupor. The fatal termination in cases of chronic Bright's disease is commonly by this form of uræmia. It may occur, as an exception, in the early stage of the inflammatory form.

Diagnosis. — Acute comatose uræmia may closely resemble cerebral apoplexy with loss of consciousness, but may be distinguished from it by the absence of unilateral paralysis, the character of the breathing, pulse, and heart-action, and the condition of the urine.

Acute convulsive uræmia may resemble epilepsy, but it usually lacks the initial cry, the death-like pallor, the predominance of unilateral convulsions, the inturning of the thumbs upon the palms, and the loss of reflex irritability. The urine, after an epileptic seizure, may reveal the presence of albumin and a diminution of urea, but it soon returns to a normal condition; in uræmia it is always distinctly albuminous. The condition of the pupils and the examination of the urine will distinguish this condition from poisoning by opium or belladonna.

Chronic uræmia, when fairly estab-

lished, is usually recognized without difficulty. An examination of the urine furnishes the most valuable evidence. Chronic uræmia may sometimes resemble fever or meningitis, from which it may be differentiated by the history of the illness, the condition of the urine, the temperature, breathing, and weak pulse and heart-action. Pepper calls our attention to certain cases which develop gradually and pass into a typical typhoid state, which cases are met most frequently at or after middle life and in connection with chronic interstitial nephritis. The facial expression and mental state are curiously like those of typhoid fever; a low grade of fever with bronchial and gastro-intestinal catarrh is not unusual. The detection of arteriosclerosis and cardiac hypertrophy and albuminuria with casts; the odor of the breath; the absence of eruption, epistaxis, and splenic enlargement; and the history and course of the case will serve to establish a diagnosis.

Literature of '97-'98-'99.

In latent uræmia suppression of urine is observed, but many days may pass before uræmic symptoms are noticed. The intelligence may be quite unaffected within a short period before death. Uræmic symptoms first appear in the form of twitchings and vomiting. This latent uræmia is present in cases of calculous obstruction of the ureters, but is by no means limited to this condition. As regards the condition of the urine, fatal uræmia may ensue in cases in which urine is free from albumin. J. R. Bradford (*Clin. Jour.*, Jan. 25, '99).

Etiology.—The etiology of uræmia is not definitely known. Francis Delafield says that contraction of the arteries (a condition existing in acute uræmia) causes the involuntary contraction of groups of muscles, general convulsions, stupor, coma, dyspnœa, labored heart-action, hypertrophy of the left ventricle

of the heart, blindness, aphasia, hemiplegia, a high temperature, and, perhaps, dropsy. Acute uræmia is often developed in nephritis while the specific gravity of the urine is still good, and the quantity of the urine is not diminished until after the contraction of the arteries is established. There can be no reason, therefore, to believe, says Delafield, that the contraction of the arteries is due to contamination of the blood by excrementitious substances, and we must frankly admit that the reason of the contraction is yet unknown. We know, however, from a wide experience, he adds, that when by the use of drugs we can dilate the arteries, the symptoms dependent upon their contraction will disappear. Chronic uræmia is developed in persons who are passing little or no urine, or urine of low specific gravity, and is evidently caused by the contamination of the blood by excrementitious substances.

Literature of '97-'98-'99.

Personal inclination is to the view that the conception of the term uræmia should be extended to include every case of renal insufficiency for urea, although well-defined uræmic symptoms be wanting. Typical uræmic symptoms may arise in persons whose blood shows no increase in urea, but this fact does not deprive the accumulation of urea, salts, etc., of clinical significance; it merely illustrates that the pathological basis of what is clinically termed uræmia is not always the same. It seems desirable that any toxæmia should be regarded as uræmic which can be shown to depend on the incapacity of the kidney to perform the functions of a healthy kidney, whether these functions consist simply in the elimination of substances as they exist in the blood furnished by the renal artery, or whether they shall be shown also to consist in the transformation of certain elements of the blood previous to elimination. C. A. Herter (*Montreal Med. Jour.*, May, '98).

Prognosis.—The occurrence of uræmia is always grave. The acute forms are often recovered from, or subside spontaneously. When they are due to chronic renal disease, recovery is, as a rule, out of the question; they may be looked upon as the messenger of death. When they are due to acute disease, the prognosis is more hopeful, as the conditions leading up to them are often amenable to treatment. Puerperal cases are very frequently recovered from, as the combination of circumstances upon which they owe their origin is of short duration.

The chronic form of uræmia is utterly hopeless, and, when it appears, the patients' days are numbered.

Treatment.—The first indication is to restore the secretory functions of the kidneys. To this end we may apply cups, leeches, or poultices over the loins and administer bland diuretics. It is often found that the action of diuretics is delayed until the bowels have been well emptied by means of jalap, elaterium, or calomel purges. The use of the hot pack or of diaphoretics will hasten and assist the action of a diuretic. Venesection has its advocates, especially in puerperal and acute inflammatory cases.

In the selection of drugs for the treatment of uræmia, the following clear and scientific directions are given by Francis Delafield, of New York: "As disturbance of the circulation, with dyspnœa, vomiting, or cerebral symptoms are liable to come on at any time, we constantly watch the heart and arteries. If the arteries become contracted and the pulse tense, we at once give iodide of potash, nitroglycerin, chloral-hydrate, or opium. If the heart's action becomes feeble, we use digitalis, caffeine, or strophanthus. As regards the use of opium, it is apparently safe and beneficial to use it if the arteries are contracted; if they are not, even a

little opium may cause poisoning and death. So with general convulsions or sudden coma—an hypodermic injection of from $\frac{1}{8}$ to $\frac{1}{4}$ grain of morphine may be of decided benefit; and in protracted contraction of the arteries, with sleeplessness and restlessness, $\frac{1}{8}$ grain of morphine every three hours may give great relief."

Tonic remedies and milk diet (nourishing, diuretic, and supplying little excrementitious matter) may be given to prevent, if possible, a return of the symptoms. In puerperal cases delivery should be completed with as little delay as possible.

Literature of '97-'98-'99.

In cases of uræmia, both acute and chronic, in which an exclusively milk diet is badly borne, pure water, together with an exclusively vegetable diet, is of value. Under this treatment it has been found in these cases that every trace of albumin disappeared from the urine, and generally the proportion of albumin under such dieting was less than under a milk diet pure and simple. The treatment should be temporary, only lasting a few days. Renon (*Revue Thér.*, July 1, '99).

Treatment of uræmia consists in lavage of the stomach, the intestine, and the blood. The object is to diminish the sources of intoxication. Possibly the patient has hyperchlorhydria; then the stomach sometimes contains very powerful toxins. In such a case, with contraction of the extremities, a toxin has been isolated capable of killing a rabbit in a few minutes.

In lavage of the intestine, ordinary enemata are not sufficient. Twice or thrice a day one should introduce, by a long, soft tube, $3\frac{1}{2}$ pints of boiled water containing 7 per cent. of table-salt.

In lavage of the blood, it is not necessary to introduce saline solution directly into the veins. The introduction subcutaneously of 7 to 10 or even 17 ounces, twice or thrice a day, acts almost as well. Three and a half pints have been injected

at a time. In a month, one patient received 29 pints subcutaneously and 24 by the rectum.

The "three lavages" have given excellent results in the treatment of uræmia. This treatment is preferred to emetics and purgatives. Purgatives, emetics, and bleedings should not be altogether renounced, however. Sometimes blood-letting, in considerable quantity, should precede the subcutaneous injection. H. Huchard (Jour. des Pract., Feb. 4, '99).

As it seemed certain that the blood of the renal veins would contain the essential principles of the internal secretion of the kidney, it was suggested that injection of such blood might yield still better results. A special experimental study of the question was made in the Lyons Hospital. The blood of the renal veins of a young and healthy goat was drawn aseptically, its serum was allowed to separate, and then it was put up in 20-cubic-centimetre bottles. This serum gave rise to no unpleasant effects when injected subcutaneously, and was used in three cases of uræmia with good results. Improvement generally showed itself within three hours of an injection. The violent headache first disappeared, while the nervous troubles, prostration, etc., were sometimes replaced by almost exuberant gaiety. Vomiting ceased after a single injection, and the oppression and dyspnoea ceased after a short time, the urine becoming abundant as the œdema disappeared. Lignerolles (Treatment, Oct. 12, '99).

URINARY SYSTEM, DISEASES OF.

Diseases of the Kidneys (see also

BRIGHT'S DISEASE, volume i).

Pyelitis (Pyelonephritis; Pyonephrosis).

Definition.—Inflammation of the pelvis of the kidney. Concomitant inflammation of the renal substance justifies the term *pyelonephritis*; and intense and extensive purulent involvement, the term *pyonephrosis*.

Symptoms.—These are frequently overshadowed by those of the primary condition that causes the pyelitis; they

are varied, also, for the same reason. The simple catarrhal pyelitis may cause slight pain and tenderness in the region of the affected kidney or kidneys, mild fever, with a turbid urine of acid reaction, showing a few pus-cells, a little mucus, rarely some red corpuscles, and a trace of albumin, perhaps.

In the severer varieties, as in calculous pyelitis, the occasional concomitant attacks of renal colic are attended with the presence of blood and pus in the urine, with some mucus, and the transitional caudate epithelial cells from the middle layers of the mucosa of the renal pelvis. The presence of the latter, however, is not constant; hence their absence does not exclude the existence of a pyelitis, since some of the most destructive forms of the affection, as the acute or chronic suppurative or the pyelonephritic may be unaccompanied by the presence of the pelvic epithelium in the urine. This holds true still more in the case of pyonephrosis, in which the kidney often becomes one large abscess.

In severe pyelitis the pain is very acute, coursing down the ureters. The fever is moderate; and most of the symptoms common to nephrolithiasis are manifested.

Literature of '97-'98-'99.

The symptom of a well-marked pyelitis is a pain in the loins, with extension to the abdomen, to the groin, to the thigh, and to the testicles. There is also tenderness: urination is frequent, and very often painful. The urine is found to contain albumin, mucous casts, epithelium, in the marked cases pus. W. M. Ord (Practitioner, Sept., '97).

In *pyonephrosis* and *pyelonephritis* the fever is rather hectic or typhoid in type. Paroxysms of rigors or chills, followed by a rapid rise of temperature to 104° or 105°, and ending in profuse and exhausting sweat, may be observed; or

there may be marked prostration, dryness of tongue and skin, feebleness of pulse, stupor, and delirium. Pyæmic cases reveal a temperature-curve of irregular course, with marked remissions.

In obstructive pyelitis the urine sometimes flows freely and normally for awhile, until the increasing pain over the affected kidney ends in relief by the expulsion of the obstacle and the passage of purulent urine. This alternation of normal with purulent urine is indicative of a unilateral pyelitis.

The urine is ammoniacal in cysto-pyelitis. Albuminuria is shown according to the degree of pyuria, and associated nephritis.

In chronic suppurative pyelitis or pyelonephritis the pyuria is variable, both in quantity and constancy. Intermittent pyuria may be due to the temporary blocking of the ureter by a stone (obstructive pyelitis). The pus is seldom mixed with epithelium in chronic purulent pyelitis. The associated intermittent fever may be like that of tuberculous pyelitis, and marked prostration, anæmia, and emaciation are concomitants. Evidences of amyloid change may be revealed in long-standing chronic cases.

The term *ammoniamia* has been applied to that complexus of nervous symptoms that is supposed to arise from the decomposition and absorption of urinary substances. These symptoms may be similar to the manifestations of diabetic coma.

Distinct enlargement and fluctuation in the lumbar region may be determined in many cases of pyonephrosis. This may also be intermittent, being detectable while there is obstruction to the flow of pus, and *vice versâ*. According to A. H. Smith, at the menstrual periods pyelitis may be subject to marked exacerbations, simulating renal colic.

In chronic pyelitis with progressive atrophy of the kidney, uræmia is likely to terminate the case.

Diagnosis. — Besides excluding other affections that might be confounded with pyelitis, it is important to attend to the history of the case with a view to the discovery of the cause; the urinary findings must also be studied carefully. The very nature of this affection makes it often most difficult to exclude other affections of the urinary tract, as nephritis, cystitis, and urethritis. Any severe inflammation of the tract in which the lower portion is known to be affected is generally associated with pyelitis or pyelonephritis, from the well-known tendency to extension by continuity.

Epithelium from the pelvis of the kidney cannot well be distinguished from transitional bladder-cells; but, given the indications of a pyelitis, its calculous cause is at once made clear upon the passage of the characteristic uratic or oxalatic concretions. It may happen that the urine from one kidney is prevented from flowing by the impaction of a stone in the ureter. The urine may now flow clear from the other and vicariously acting kidney until, the stone having given way, it suddenly increases in quantity and changes in character, owing to the return of the morphological elements of the pyelitis (corpuseles, desquamated epithelium, crystals, and *débris*).

Catheterization of the ureters and renal pelves, particularly in women, as described and practiced by Pawlik and Kelly, is a certain method of determining from which side the purulent urine flows. Palpation of the ureters through the vagina will sometimes reveal thickening and tenderness in cysto-pyelitis, and ureteral distension may sometimes be felt in pyelitis calculosa.

Vierordt mentions having seen in some

cases of pyelonephritis, peculiar hyaline casts "split like a pair of trousers." Casts and albumin are usually present when the kidney-structure is involved by extension of the pyelitis, while marked pain in the region of the kidney indicates predominant pyelitis, though it does not exclude the possibility of co-existing nephritis. Marked vesical irritability points to associated cystitis; but in intense pyelitis with much pus and an acid urine, vesical tenesmus may also be troublesome. Tuberculous can be discriminated from calculous pyelitis, possibly, only by a consideration of the history and general condition, and by the detection of tubercle bacilli in the pus. The presence of a fluctuating tumor in the lumbar region is significant enough of pus, but it is very difficult to determine whether it is due to pyonephrosis or perinephric abscess; the history, pyuria, and less œdematous overlying tissues of the former are important distinguishing points.

The *hæmorrhagic pyelitis* of Senator, Delafield, and others, described as occurring in milder forms, and particularly in girls of neurotic types, may be revealed by the intermittent hæmaturia and occasional lumbar pain, lasting but a few days or a week, and followed uniformly by recovery. Digestive disturbances may be prominent in these cases.

Much difficulty is sometimes experienced in diagnosing pyelitis when co-existent with cystitis. It should be recollected that their histories differ, pain in the lumbar region being present in the former and in the bladder in the latter; acid pus is usually characteristic of pyelitis.

Literature of '97-'98-'99.

The following differential points based upon the study of a number of cases, suggested: (1) an alkaline reaction is not found in uncomplicated pyelitis; (2)

the maximum of albumin in the urine of cystitis is about 0.15 per cent., while in pyelitis there is not less than two or three times as much albumin; (3) if nearly all the pus-corpuscles are cre-nated, pyelitis is probably present; (4) also, if the red corpuscles show chemical and morphological decomposition, if the hæmaturia is microscopical only, and if there is no vesical tenesmus; (5) unless non-imbricated, small epithelial cells should be present, which would favor the diagnosis of some cystitis. Rosenfeld (Berl. klin. Woch., July 25, '98).

Surgical kidney, so called, which is an acute suppurative nephritis, is the result of an acute bilateral pyelitis due to the extension upward of a severe cystitis. Acute suppuration or interstitial inflammation of the kidney due to metastatic or miliary abscesses, occurs as a complication of pyæmia.

Etiology.—The causes of pyelitis are practically of secondary origin. They are mainly as follows: (1) renal calculi [the most frequent]; (2) urethritis, cystitis, or ureteritis extending upward; (3) retention of decomposed urine in the pelvis of the kidney; (4) renal affections, or tubercle, carcinoma, and acute nephritis; (5) specific fevers, including influenza, perhaps; (6) other foreign bodies than stone; (7) irritating diuretics. Regarding the cause first mentioned, it should be pointed out that calculous pyelitis may result from the irritation of the constant presence and passage of small stones ("gravel"), or even of uric-acid "sand," as well as from the large dendritic concretions that send offshoots into the calyces. Extensions of inflammation to the pelvis from lower portions of the urinary tract may occur in protracted cases of such affections as gonorrhœal urethritis and puerperal and calculous cystitis. Obstructive pyelitis sometimes follows the impaction of renal calculi or of other foreign bodies in the ureter when

there is pre-existing inflammation of the tract or when, as usually happens, there is chemical irritation from the decomposition of the accumulated urine. There may be obstruction in the bladder and urethra, as from enlarged prostate, stricture, or phimosis.

Infectious pyelitis may result from small-pox; diphtheria; typhus, scarlet, and typhoid fevers; and is probably produced by the toxic substances eliminated. Nephritis is commonly associated with it (pyelonephritis). Parasites—such as the echinococcus, distoma, strongylus, and filaria—may give rise to pyelitis.

Cantharides, cubebs, copaiba, turpentine, etc., and diabetic urine even may in rare instances excite this affection.

Pathology.—The morbid changes in the simple, catarrhal variety of pyelitis consist of a congested, swelled, and sometimes ecchymotic, mucous membrane covered with a viscid, smooth exudation of muco-pus and desquamated epithelium. The urine in the pelvis of the kidney is turbid from the admixture of pus-corpuscles and epithelium. In calculous pyelitis, owing to prolonged and severe irritation, purulent inflammation and ulceration prevail, and the renal structure is also involved by extension (*pyelonephritis*). Renal abscesses are thus formed, and small dark calculi are found frequently, mingled with the pus in numerous small abscess-cavities; or, perhaps, the destroyed renal parenchyma may be entirely replaced by one large abscess (*pyonephrosis*).

Case of pyonephrosis in which renal substance was found almost entirely destroyed and replaced by large intercommunicating cysts containing thin, turbid, fluid urine and some pus, besides eight to fifteen calculi. Loomis (Med. Record, Feb. 23, '95).

A diphtheritic inflammation, with the formation of a false membrane and

sloughing of the pelvis, sometimes follows the severe infection of the specific fevers. Marked hæmorrhagic areas may also be seen. In tuberculous pyelitis there is usually associated a nephritis with areas of tuberculous softening and ulceration, and later pyonephrosis. In certain chronic cases of pyelitis there may be cheesy masses of infiltration affecting the kidney-structure; calcification of these may ensue.

Persistent obstruction leading to pyelitis is associated with dilatation of the pelvis from retention of urine or pus (*pyonephrosis*). This, in turn, from prolonged pressure, causes the marked atrophy of the secreting structure of the kidney that is seen in such cases. There is also an increase in the interstitial tissue with secondary contraction.

Prognosis.—Renal complications always make the pyelitis a serious affection. Catarrhal cases recover. Calculous pyelitis tends toward chronicity. Pyelonephritis and pyonephrosis are likely to end fatally from exhaustion or uræmia. Perforation and the discharge of pus into the peritoneal cavity, pleural sac, intestine, and bronchi, even, may precede death. The gravity of all cases of pyelitis depends upon the causes and upon the tendency to consecutive suppuration.

Treatment.—This varies according to the cause: the latter needs to be removed, its effects counteracted, and its return avoided. The treatment of calculous pyelitis is essentially that of nephrolithiasis. Primary inflammation of the lower portion of the urinary tract must be combated, causes of urinary retention and decomposition must be diminished, infectious fevers must be judiciously handled, and irritating diuretics withheld.

In all forms of pyelitis local measures are useful, in the form of hot-water bags,

fomentations, dry cupping, etc. Internally, the use of diluents is to be encouraged, especially the alkaline mineral waters, flaxseed- and moss- teas, barley-water lemonade, skimmed and butter-milk.

Among drugs selected for their soothing properties are the potassium citrate, uva ursi, buchu, and pareira brava. In the event of suppurative surgical intervention is necessary. Irrigation by means of Kelly's ureteral catheter may be practiced with good results in females suffering from purulent pyelitis. Operation through the back is usually indicated in pyelonephritis and pyonephrosis. In chronic pyelitis such stimulating and alterative drugs as salol, and the oils of turpentine, sandal-wood, juniper, copaiba, and erigeron, may be tried.

Bovet and Huchard recommend the treatment of infectious pyelonephritis by the hypodermoclysis of chloride-of-sodium solution.

The first element of importance in pyelitis is diet. In the acute form the patient should be kept in bed till the urine be normal and micturition easy, with milk diet and lukewarm baths; every second day a good rubbing. In the summer months his residence should be at the sea-coast, with lukewarm sea-water baths. In chronic cases the wells of Vichy, Carlsbad, and the different carbonic springs, as Biliner Sauerbrunn, Prelauwasser, Krondorfer, Sauerling, etc., may be found beneficial. In place of those mineral waters, aqua calcis, 6½ to 19 ounces several times a day, may be substituted. In the early stages of acute pyelitis, tannin, alum, and acetate of lead are often found useful; in chronic cases small doses of extract of *secale cornutum* have been administered with advantage. Monti (*Inter. klin. Rund.*, Mar., '93).

Large doses of creasote recommended in pyelonephritis. Weber (*Sem. Méd.*, No. 72, '93).

Treatment of pyelitis with irrigations

of the ureters advocated. Diagnosis made by catheterizing the ureters, and then the bladder and the pelvis of the kidney are irrigated with silver nitrate of the strength of 1 to 1000 at intervals of four days. Casper (*Allg. med. central-Zeit.*, No. 77, '95).

Amyloid, Lardaceous, or Waxy Kidney.

It is an open question whether this condition should be considered separately, since it is but a local manifestation of a wide-spread process due to various causes: syphilis, tuberculosis, etc. It also appears as the manifestation of the degenerative process of advanced Bright's disease, especially in the form following low fevers. It has already been alluded to in the article on BRIGHT'S DISEASE (volume i).

Symptoms.—The condition itself may not present distinct clinical features. There is usually found a history of long-continued suppuration, or of syphilis; perhaps of alcohol. The urine gives generally very fairly characteristic indications. Its quantity is increased, its specific gravity is somewhat, but not greatly, diminished, varying from 1015 down to 1005. It is usually singularly clear and translucent, and on standing yields very little sediment. Under the microscope may be found a few casts which are generally hyaline. Albumin is present in large quantity. In later stages, when degeneration has set in, the urine becomes reduced in quantity, is mostly turbid, and then presents under the microscope the morphological signs belonging to the degenerative process. There are associated with this condition of urine anæmia, debility, but not often much dropsy, with the characteristic transparent and delicate complexion. There is usually degeneration of blood; often diarrhœa and vomiting. Cerebral symptoms are not at all common. The arteries are

usually soft, and the heart generally shows very little change. Death comes by wasting, diarrhoea, inflammation, and the kindred affections of the liver and other organs. (W. M. Ord.)

Diagnosis.—The diagnosis cannot usually be made from the urinary examinations alone. But if following syphilis, tuberculosis, or chronic bone-suppurative, the urine is found to be albuminous, of low specific gravity, and increased in quantity, and the liver and spleen are enlarged, the diagnosis of amyloid disease may be made with comparative certainty.

Etiology.—Amyloid kidney is usually associated with amyloid degeneration in other organs, as the liver and spleen, and is the result of wasting diseases, tuberculosis of the lungs or intestines, syphilis especially tertiary, chronic bone-suppurative, or other prolonged suppurative processes. It may sometimes be a sequel of gout or chronic valvular insufficiency.

Experiments with turpentine in the case of three dogs, by which waxy changes were produced in all, the spleen being most extensively affected. Czerny (Centralb. f. allg. Path., Apr. 15, '96).

Pathology.—Macroscopical examination shows the kidney to be firm, large, smooth, and pale, except where the stellate veins are prominent. The capsule is easily detached. Upon section the cortex is seen to be wider than normal and pale, while the pyramids are deep red. The Malpighian tufts, which are the parts most affected by the waxy change, are translucent. Accompanying this degeneration is a diffuse nephritis,—with fatty degeneration affecting the epithelium of the tubes especially,—glomerulitis, and thickening of Bowman's capsules.

Prognosis.—This depends, to a great extent, upon the disease which is the

cause of the amyloid condition, but is usually very grave.

Treatment.—The original disease is to be treated according to indications, while the kidney trouble will be best met by the remedies and general dietetic and hygienic measures used in chronic Bright's disease (*q. v.*, volume i).

J. M. ANDERS,
Philadelphia.

URINARY SYSTEM, DISEASES OF (SURGICAL).

Diseases of the Kidneys (CONTINUED).

Movable and Floating Kidney.

The term *movable* kidney is used to designate those cases of displaced and not fixed kidney in which the movements are entirely subperitoneal. In *floating* kidney the movements are intra-abdominal; the organ is surrounded by peritoneum and has more or less of a mesonephron. The former variety is usually acquired, while the latter is said to be only congenital. This, however, is quite doubtful.

Symptoms.—The subjective signs of movable kidney range from slight discomfort to intense pain, depending, to some extent, on the amount of mobility. Most commonly the pain is dull, aching, or dragging, located in the loin and aggravated by exertion, constipation, and often by menstruation. Occasionally it is paroxysmal, not unlike renal colic. Kinking or torsion of the ureter may cause transitory attacks of hydronephrosis. Gastric symptoms and disorders of digestion have also been frequently observed.

[Edebohls (Centralb. f. Gyn., xxii Jahrg., No. 40) reports fifty-eight cases in which he believes appendicitis was caused by the venous stasis in the region of the cæcum resulting from the pressure of floating kidney. This view seems confirmed by the relief of symp-

toms in twelve cases by nephropexy. W. W. KEEN and M. B. TINKER.]

Literature of '97-'98-'99.

The chief symptoms of movable kidney are pains in the back, generally of a changing character, from dull to sharp. Dizziness is also a frequent symptom. Then come those symptoms due to enteroptosis and the gastric symptoms. Those of the circulatory system, consisting of palpitation, sometimes irregular heart-action, distension of the abdominal aorta, throbbing of this vessel, kinking of the renal artery, and occasionally a bruit in this place. Then the symptoms from the nervous system; neurasthenia, trembling, dizziness, occipital or frontal headaches, and deep depression. A great many of the symptoms of the movable kidney are doubtless caused by pressure on the solar plexus. Gustav Fütterer (*Amer. Gynæc. and Obstet. Jour.*, Feb., '99).

The symptoms of movable kidney in children are very variable; often the affection is absolutely latent. Pain, at times paroxysmal, is sometimes present, and may come on after some unusual fatigue or effort. The kidney may become twisted and the ureter occluded, causing hydronephrosis, which may be transitory, intermittent, or persistent. Coprostasis, appendicitis, different cystic or solid tumors of the kidney, perinephritis, and stone are among the conditions to be excluded. Palpation usually reveals the presence of a smooth, rounded, movable mass. Comby (*Amer. Jour. Med. Sci.*, Mar., '99).

On palpation, a tumor of the size, form, and consistency of the kidney can be usually made out; the tumor slips away under the fingers, generally to the region of the loin. The range of mobility may be slight, but in some cases it is so great that the tumor may be felt near or past the median line or in the inguinal region. Manipulation often gives rise to sickening pain, similar to that produced by compression of the testicle or ovary.

The diagnosis from very mobile, dis-

tended gall-bladder and tumors of the intestine, especially the large intestine, is sometimes difficult. The kidney is much more deeply located posteriorly, however, and if it is possible to fix the liver it will be impossible to make the gall-bladder disappear as the kidney does.

Apart from tumors of the kidney itself, the condition most likely to be mistaken for movable kidney is distended gall-bladder.

In differentiating a distended gall-bladder, the history, the usually anterior position of the tumor, the difference in the planes of attachments, the constant situation of the gall-bladder, and the variable situation of the kidney are sufficient to render the diagnosis comparatively easy.

New growths in the abdomen may also be confounded with movable kidney. Here the character of the suffering, the cachexia, and often intestinal obstruction, together with the shape and density of these growths, are in sharp contrast to the history, symptoms, and mobility of the kidney. Repeated examinations, and, if necessary, anaesthesia, will enable one to establish the diagnosis in doubtful cases. G. B. Johnston (*Annals of Surg.*, Feb., '95).

Literature of '97-'98-'99.

In the diagnosis of movable kidney one should find a more or less movable tumor somewhere in the abdomen, which has the size, shape, and consistency of a kidney. An attempt is to be made to feel the hilus, and, if possible, the pulsation of the renal artery. This examination is best made by relaxing the abdominal walls by flexing the thighs and raising the upper portion of the body, standing on the right side of the patient if the right kidney is being examined. The left hand is put in the right lumbar region pressing upward, while the right hand carefully palpates the abdomen and only gradually goes down deeper. If in this way a tumor is found which seems to be the kidney, the patient should be put into the knee-elbow position and one should try to percuss both

kidneys in order to ascertain the absence of one of them. Gustav Fütterer (*Amer. Gynæc. and Obstet. Jour.*, Feb., '99).

In the case of intestinal tumors, stenosis of the gut sometimes settles the diagnosis. Tumors of the omentum occupying the right hypochondrium are rare, growths of the pylorus usually cause greater gastric disturbance and are situated higher and nearer the median line, and impacted feces disappear after a purge.

Etiology.—The condition is much more common in women; it is most frequent during the child-bearing period and particularly in women who have borne several children. This is thought to be because of the lax condition of the peritoneum, of the abdominal wall, and the absorption of the circumrenal fat thus induced, for movable kidney may follow emaciation due to any wasting disease. The right kidney is affected four times as often as the left; this is attributed to the proximity of the liver, which, in its movement downward with the diaphragm, may force the kidney before it. Traumatism has been mentioned as a cause, but this is not in accord with the infrequency of the condition among males. Probably in most cases renal mobility is to be attributed to a combination of several causes.

Literature of '97-'98-'99.

Eighteen cases of movable kidney in children personally encountered. Of the 18 cases, 2 were aged, respectively, 1 month and 3 months; 6 were between 1 and 10 years; and 10 were above 10 years of age. The mobility doubtless dated back further than this. Of the cases 16 were girls and 2 were boys: the same proportion of the condition in the female sex observed in adult life. In 14 of the cases the mobility was associated with dyspepsia and dilatation of the stomach; hereditary syphilis was

obvious in 2 cases; chlorosis in 2; lien-teric diarrhœa in 1; migraine in 1; and psoriasis in 1. In nearly every case the affection was latent; in 2 it had been mistaken for a chronic appendicitis; twice it had been recognized and treated.

The greater number of the patients wore neither corset nor belt. Litten, Gutterbock, Ewald, and Albarran believe all cases to be of congenital origin. Comby (*Amer. Jour. Med. Sci.*, Mar., '99).

Treatment.—In a very few cases the application of a suitable abdominal support is all that is necessary; if it proves unavailing, operation should be considered.

Literature of '97-'98-'99.

Ordinary support of the kidney by means of a belt properly adjusted while the patient is on the back is all that is required in the majority of these cases. The amount of pressure necessary to hold a kidney in place is very slight. Frequent resort to surgical interference in these cases deprecated. McNaughton (*Brooklyn Med. Jour.*, Feb., '98).

Mechanotherapy will afford equally as good results as operative procedures if carefully applied. Five cases treated by application of abdominal pad and belt, massage, and exercises, with relief of all the symptoms. In 16 cases, where the rest-cure simply was employed, 8 were more or less permanently improved, 7 unimproved, and 1 disappeared. The permanence of absence of symptoms depends chiefly upon the extent to which the body-weight is maintained. Symons Eccles (*Lancet*, Jan. 9, '98).

When in movable kidney in children the affection is latent or well borne, rest and an abdominal belt may suffice to relieve the symptoms. A flannel bandage wound several times around the body and supporting the abdomen is the best means of immobilization that can be devised. Dyspepsia and constipation should receive careful treatment. In the event of persistent unbearable pains, peritonitis and hydronephrosis from twisting of the ureter, an operation should be performed, fixing the kidney

to the posterior abdominal wall. Jules Comby (Brit. Med. Jour., Oct. 15, '98).

The abdominal bandage is a very valuable resource if one expects from it no more than a relief of the symptoms which result from the abnormal mobility of the kidneys (and other prolapsed abdominal organs). If, however, it is expected that this measure will at the same time remove all the existing disturbances (gastric and intestinal affections), one will meet everywhere with disappointment.

The disturbances of the stomach and intestinal canal must be treated according to the principles prevailing at the present time.

Besides a serviceable, well-fitting abdominal bandage (a cushion for the kidney can almost always be omitted), the medical treatment consists in promoting the nutrition and strengthening the organism. The former is done by a liberal diet (forced feeding), so that an increase in weight takes place. The latter is accomplished by gymnastics, by general massage, and electricity. In a few cases, after a considerable increase in flesh has occurred, there is not only a disappearance of all the subjective symptoms, but also the return of a previously movable kidney in the second or even third degree to its normal position, so that the organ can no longer be palpated.

Personal experiences point decidedly in favor of medical treatment. While, in general, operative treatment in cases of floating kidney is opposed, still in rare instances nephrorrhaphy may be justifiable especially when a connection between the symptoms (both the direct as well as the gastro-intestinal disturbances) and a movable kidney appears to be proved in a high degree, and the above-described dietetic-mechanical methods of treatment have completely failed. Every surgeon, before advising operative intervention in movable kidney, should completely exhaust the suggestions and remedies of the physician. Einhorn (Med. Record, Aug. 13, '98).

In floating kidney the Weir-Mitchell treatment of rest and forced feeding has been followed by great benefit; and a few cases are on record of apparent cure of the disease without treatment, simply

because an improvement in nutrition took place. The only good that we may hope to accomplish with a pad and bandage is by crowding up the whole of the abdominal contents. For this purpose a round cushion should be made of chamois-leather, and covered with a movable cotton cover, to be frequently changed. This cushion should be filled with curled hair for the sake of elasticity and lightness; and, indeed, an air-cushion of rubber might do as well, and it should be thick enough to give the woman, when it is applied, a distinct roundness or plumpness of the abdomen. It should be put on while the patient is lying on his back, and held in place firmly by means of a broad flannel or woven elastic bandage, so as to keep it evenly pushed into the abdomen. When the patient stands erect all the abdominal contents will be supported, and the patient will experience great comfort immediately.

In those cases in which the above methods of treatment are impracticable or unsuccessful, nephrorrhaphy, which, as a rule, gives very satisfactory results, must be resorted to. A. Laphorn Smith (Canadian Jour. of Med. and Surg., Nov., '99).

OPERATIVE PROCEDURES.—*Nephropexy or Nephrorrhaphy.*—By this term is meant the operation for fixation of a movable kidney. The operation was first performed in 1881 by Hahn, of Berlin, who operated upon two cases of movable kidney in April of that year.

Before the introduction of nephropexy, nephrectomy was performed for the relief of movable kidney; but at present it would only be considered justifiable in case of some severe complication, such as strangulation or suppuration.

Two hundred and eighty-three cases of nephrorrhaphy collected, of which 9 are personal, for movable kidney. Of these, 65.32 per cent. were cured, 10.36 per cent. improved, 22.07 per cent. were failures, and 1.82 per cent. were fatal. This operation should be undertaken in all cases of movable kidney where me-

chanical appliances have failed. C. Neumann (Centralb. f. Chir., No. 21, '93).

Statistics of 134 cases, of which 4 died ($2\frac{88}{100}$ per cent). Of the 121 detailed thoroughly, 63 were permanently cured, 21 improved, 19 failed. Four personal successful cases of nephrorrhaphy in which the kidney-substance was sutured and attached to the split deep aponeurosis with six boiled-silk sutures. W. W. Keen (Annals of Surg., Aug., '90).

Out of 374 operative cases of movable kidney but 7 deaths occurred within four months of the operation. In 4 instances only could death be attributed to the operation. As regards relief of symptoms, the results were successful in 78 cases out of 100 in which intraparenchymatous sutures were employed. Nervous symptoms were, however, less often relieved than painful ones, 14 out of 100 being partially relieved, while 36 out of 100 received no benefit in this particular. With respect to pain, nephrorrhaphy was successful in 88 cases out of 100. Albarran (Gaz. Méd. de Paris, Sept. 14, 21, '95).

Literature of '97-'98-'99.

Incising and separating the fibrous capsule in floating kidney strongly objected to. Extensive removal of the fatty capsule advocated. In last 4 personal cases no sutures were used, but a large amount of the fatty capsule was excised, the fibrous capsule scarified, and the kidney supported temporarily by a piece of iodoform gauze. After the operation pressure should be applied over the front of the abdomen and the patient should remain recumbent for a long time. Senn (Jour. Amer. Med. Assoc., Dec. 11, '97).

Six patients with seven operations (i.e., in one a double nephrorrhaphy), all recovered. In no instance, so far as can be ascertained, did recurrence take place, and the elapsed time varies from one to fourteen years. Robert F. Weir (Med. News, Jan. 15, '98).

Technique of Nephropexy.—The patient is placed on the side, resting on a hard pillow or pad, so as to increase the costo-iliac space. The incision for ne-

phropexy answers also for nephrotomy, nephrolithotomy, and nephrectomy. The twelfth rib is carefully located by both palpation and counting, to avoid the possibility of opening the pleura. Beginning half an inch below the last rib and close to the outer border of the erector spinæ, the incision is carried obliquely downward and forward for about 7 to 8 centimetres (3 inches). It divides the skin and subcutaneous tissues, the superficial fascia, the latissimus dorsi, the external oblique, the internal oblique, the transversalis with its aponeurosis, and the deep layer of the lumbar fascia. The anterior border of the quadratus lumborum may require division if impossible to retract it sufficiently. Broad retractors are now made to gather up all the divided tissues, and the perinephric fat will bulge in the wound. The fat is separated by the fingers or by two pairs of dissecting forceps and the fibrous capsule is exposed. The kidney is pushed well upward and into the loin by the hand of an assistant pressing on the abdominal wall. Special care should be taken that the kidney be in its normal position. The kidney is secured by passing four to six sutures through the capsule and about 2 centimetres (1 inch) of kidney-substance and then through the adjacent fascia and muscles of the wound, tying subcutaneously. Fine silk, kangaroo-tendon, and chromicized catgut are used as suture-material; but, if catgut is used, it should be made certain that it is not too readily absorbable.

Silk-worm gut is the best substance with which to suture the kidney in place. Guermontez (Inter. Jour. of Surg., Apr., '89).

After the kidney is firmly fastened in place the external wound is closed and the usual aseptic dressing applied.

Various modifications of this operation

have been suggested, having, as their main object, the securing of firmer or more general adhesions about the kidney.

Leaving a drainage-tube along the convex border of the kidney for some time, packing the wound with gauze, incising and stripping back the capsule so as to get a raw surface in contact with the surrounding parts may be mentioned as prominent among these procedures, but simply stitching the kidney in place, as described, has given perfectly satisfactory and permanent results in the experience of several prominent surgeons. While the oblique incision is generally recommended, a vertical incision along the sacro-lumbalis muscle permits of more ready access for the purpose of sewing the kidney in its normal axis.

Good nephrorrhaphy should be: (1) a benign operation; (2) should assure fixation of the whole kidney, allow free flow of urine; and (3) alter as little as possible the renal substance.

Removal of the adipose capsule advised so as to allow the kidney to be brought in direct apposition to the parietes, as this gives a firmer cicatrix. It is good practice to bathe the surface of the capsule with strong phenol solution or AgNO_3 (4 per cent.). Parenchymatous nephrorrhaphy, without decortication of the kidney, appears to give the best results. Catgut sutures seem, on the whole, to produce less irritation than silk. Albarran (*Ann. des Mal. des Organ. Gen.-Urin.*, Aug., '95).

Renal Calculus.

Symptoms.—Pain and hæmorrhage are the most important symptoms, in case the stone is small and the kidney healthy; indeed, these may be the only symptoms present. The pain is usually felt in the loin over the affected organ; it is of a dull, heavy, dragging character. Hæmaturia is generally remittent, the amount of blood passed is not great, it is thoroughly mixed with the urine, and the

blood-cells are altered. A larger calculus, producing suppuration, is suggested by pus in the urine with pain on pressure and perhaps increased resistance in the loin. A calculus blocking the ureter and producing hydronephrosis is suggested by feeling a soft, elastic tumor of variable size through the abdominal walls or in the lumbar region; but this is apt to disappear simultaneously with the passage of a large amount of urine. The attacks usually recur and the urine becomes alkaline or putrid. Vesical irritation, pain, retraction of the testes, and gastric disturbances are other symptoms frequently met with in all forms of renal calculus. In case of renal colic there is acute suffering, the pain shooting down the ureter to the testicle or labium majus and often radiating to the thigh. There may be nausea and ineffectual vomiting, vesical tenesmus, faintness, cold sweating, and even collapse. Oftentimes the pain ceases as suddenly as it began; but relief is not permanent unless the stone has receded into the pelvis of the kidney or has passed into the bladder. The paroxysms of pain recur at intervals of from a few minutes to several hours or days.

Diagnosis.—In the differential diagnosis from stone and malignant or villous growths of the bladder the imperfect mixing of the blood with urine, the larger amount of blood, less altered blood-cells, the presence of clots, and more severe pain would be of aid. In the case of malignant growths of the kidney the cachexia and the palpation of a tumor, possibly irregular in outline, are of use in establishing a diagnosis.

The Röntgen rays have been used by a considerable number of surgeons, and with quite satisfactory results in most cases. Calculi of calcium oxalate give the most distinct pictures, those formed

of urates are less easily recognized, and phosphatic calculi are most difficult to photograph.

Etiology and Pathology.—Renal calculus occurs most frequently in males, before the age of 15 and in later years of life. Its formation depends upon the gluing together of crystalline particles or amorphous salts in the urine by colloid material from blood-clot or mucus. The masses thus formed vary in size from sand to that of a hen's egg; some of them assume the shape of branches of coral. The nuclei of calculi are said to consist most commonly of ammonium urate in children, uric acid in adult life, and calcium oxalate after the fortieth year. The phosphates, cystin, and xanthin less frequently give rise to renal calculi.

A small stone may be lodged in healthy renal tissue, giving rise, perhaps, to bleeding, congestion, and inflammation and various nervous symptoms; or it may cause the formation of an abscess in the substance of the kidney. Gravel may pass from the uriniferous tubules and be carried away by the current of urine without causing symptoms. A small stone may pass along the ureter with difficulty, causing renal colic; it may remain a movable body in the pelvis, by its irritation producing pyelitis or by stopping the ureteral orifice produce hydronephrosis; or it may be lodged in the pelvis or calices, forming a large, sometimes branched, calculus and give rise to inflammation, suppuration, and thickening of the tissues about it.

Treatment, Medical.—During the attack of colic the patient is to be given the hot bath and hot drinks of lemonade or soda-water, while hot fomentations are to be applied to the loins. If these measures are insufficient to bring relief, morphine or even chloroform may be used.

Between the attacks attention must

first be directed to hygienic and dietetic measures. Moderate exercise is to be taken daily in the open air and the patient is to lead as quiet and temperate a life as is possible. Overeating and indulgence in alcohol should be prohibited. Large quantities of water, either mineral—such as lithia, Poland, Carlsbad, and Vichy—or distilled, are to be taken daily. The bicarbonate or citrate or potassium given in 1-drachm doses in a tumblerful of water two or three times daily, or the benzoate or carbonate of lithia in 5-grain doses three times a day are of value. Piperazin is claimed by some to be a solvent for uric-acid calculi and may be exhibited in 5-grain doses three or four times daily.

Literature of '97-'98-'99.

In renal colic local measures consist of hot applications. Prolonged hot baths accelerate the crisis and promote diuresis caused by mineral waters. They are useful in moderate cases, but, when there is much vomiting and struggling, their action is only limited. Complete immersion is better than partial. The temperature should not be less than 93°, and if not contra-indicated may be gradually raised to 104° F. When there is intolerance of drugs by the stomach they should be given by the rectum. Antipyrine is especially useful. Injections of laudanum, 10 to 20 drops, may be used after first washing out the rectum. Inhalations of chloroform or ether may be used when there is danger of abortion, or when the nervous symptoms are exaggerated. Marboux (*Lyon Méd.*, p. 407. Mar. 21, '97).

Treatment, Surgical.—Nephrolithotomy—the removal of a stone located in the substance, calices or pelvis, of the kidney—is indicated when the diagnosis is reasonably certain.

Technique of Nephrolithotomy.—The preparation of the patient and the incision are the same as for nephropexy.

Edebohls's bag, placed under the patient lying on the side, is of much value in bringing the field of operation into prominence. Deep manipulation is facilitated by dividing the outer edge of the quadratus lumborum or if more room is needed in front, for inspecting or freeing the kidney or for controlling hæmorrhage. The incision may be curved downward and forward toward the abdomen. After opening the fatty capsule of the kidney the organ should be systematically examined by pressing on its surfaces or compressing it between the thumb and fingers. Morris recommends that the pelvis and upper end of the ureter be palpated before the kidney is disturbed in its position in order to detect any small calculus that might be present and prevent its falling into the ureter during manipulation. If no hard spot is detected after the entire kidney has been squeezed between the fingers, some operators recommend that exploratory punctures be made from one end of the kidney to the other with a fine needle. This procedure is to be condemned as most unreliable for diagnostic purposes.

In case a stone is found, the kidney must be opened; and if none be found the same procedure is necessary for thorough exploration. In either case an incision should be made in the border, the infundibulum should be opened, and the calices should be subject to digital examination. When a calculus is found, it may be necessary to enlarge the wound in order to extract it. Hæmorrhage is controlled by temporary packing or by passing a catgut suture through the kidney-substance. Large calculi, particularly if branched, often have to be broken with forceps before it is possible to remove them. Openings in the pelvis sometimes give rise to urinary fistulæ; when, therefore, it seems proper and

feasible, it is best to extract through an opening into renal tissue.

Whether a calculus is found or not, the ureter should be catheterized through the pelvis of the kidney from end to end, to determine that it is not obstructed. Weir's long flexible probe of spiral steel is the best means of accomplishing this. When the renal cavity is suppurating, it should be irrigated with a weak antiseptic solution. The wound in the kidney is packed with iodoform gauze and a drainage-tube is carried behind the kidney passing out of the lower part of the incision. The wound is partly closed and dressed with the usual aseptic precautions.

Probably no major operation has a lower mortality, particularly if undertaken early before any serious renal changes have resulted.

[Morris has operated in 34 cases with only one death. Newman ("Lectures on the Surgical Diseases of the Kidney," London, '88) collected statistics of 42 cases of nephrolithotomy in which the calculus was not associated with pyuria or suppuration within the kidney, without finding a single death. KEEN and TINKER.]

Cellulitis, renal fistula, and renal abscess have been mentioned as possible consequences of the operation.

Literature of '97-'98-'99.

The aim of the surgical treatment of renal calculus should be to extend the application of nephrolithotomy and thereby restrict the necessity of nephrotomy and nephrectomy. The theory that a stone in one kidney, whether that kidney is itself painful or not, reflects or transmits pain to the opposite kidney is quite unproved. The surgical principle with regard to the exploratory operations should be that with pain, paroxysmal or continuous, on one side only, the kidney on the painful side should be explored. Nephrectomy for calculous conditions is very rarely called for and

should be done only in most exceptional cases. Nephrotomy for calculous pyonephrosis is the proper operation, because of the frequency of double calculous disease. Nephrectomy while the opposite organ is occupied by calculus is fraught with very great danger to life; whereas nephrectomy after the opposite kidney has been freed from stone will probably be followed by recovery from the operation and possibly by very good health for years afterward. When renal calculus causes reflected or transferred vesical or ovarian pain, the removal of the calculus will be followed by complete cure of the bladder or ovarian symptoms. When we have cause to suspect the presence of a calculus we should recommend its immediate removal regardless of the fact that it is not causing renal or transferred pain. Quiescent calculus is as dangerous to the possessor as unsuspected calculus, and ought to be removed by operation. The same principle should be applied to renal calculus which has long been the rule in regard to vesical calculus, namely: when suspected it should be searched for and, when known to exist, removed, without waiting in the hope that it may become encysted or spontaneously expelled. The very low mortality puts this operation upon the same footing for renal calculus as lithotripsy in the most experienced hands for vesical calculus. Henry Morris (*Lancet*, Apr. 23, '98).

Tumors of the Kidney.

The greater number of tumors of the kidney are malignant. Sarcoma, however, is much the most common form; carcinoma comes next in order; adenoma is not uncommon and is said to degenerate frequently by epithelial overgrowth into carcinoma; fibroma, lipoma, angioma, myxoma, and tumors of the adrenal are much more rarely observed.

Literature of '97-'98-'99.

An incomplete development of the fibrous-tissue capsules separating the kidney and suprarenal body is a common developmental defect. The two organs

sometimes run into one another in the region of this defect. Subsequent separation of the two organs, each retaining portions of the other, is possible. Tumors may originate from such suprarenal or renal cysts. Tubular adenomata are rounded and smooth, reaching the size of a pea, of a bluish-red color, and soft consistence, situated in the cortex, seen best after stripping off the capsule. The tubular adenomata probably take their origin in cysts of the renal tubules. In the trabecular cystomata the cystic nature is an important feature in this large class of kidney-tumors. Fat seems to be of constant occurrence in the epithelial cells of the trabecular cystomata. The trabecular cystomata also probably take their origin from the renal elements. Putting aside the tubular adenomata, there still remains two distinct types of kidney tumors.

Tumors of the first type are: 1. Common, subcapsular, often multiple, of all sizes. 2. Chiefly cystic; showing trabeculae, composed of connective tissue and capillaries, later of capillaries alone. 3. Trabeculae and cyst-wall lined by single layer of epithelium, whose protoplasm contains fat.

Tumors of the second type are: 1. Rare, subcapsular, solitary, of all sizes. 2. Chiefly solid, but often show early cystic softening. 3. Cell-columns lying in capillaries, or separated from them by fine connective tissue. Richer (*Centralb. f. allg. Path.*, June 1, '97).

A number of cases of tumor of the kidney and genito-urinary tract showing resemblance in structure to the adrenal body. In the case of a few adrenal tumors symptoms presented themselves resembling those of poisoning by adrenal extract. Bayard Holmes (*Brit. Med. Jour.*, July 9, '98).

SARCOMA is by far most frequently met with in children and is usually congenital. The tumor is generally of the round or spindle-celled variety, highly malignant, of rapid growth, and often attains enormous dimensions.

Literature of '97-'98-'99.

Three cases of renal sarcoma in children, two of which were operated upon,

and one was alive and well two years after the operation. Early infancy (from birth to five years) furnishes the largest proportion of cases, and 20 per cent. of the recorded cases occurred within the first year. The male sex is more often affected. The immense majority of renal malignant growths in children are sarcomatous or myxosarcomatous in nature. The right kidney is more often affected than the left. Concetti (Rif. Med., May 9, 10, 11, '98).

CARCINOMA is said to result in some cases from traumatic irritation, as from calculi, or to follow inflammatory processes. As a rule, the tumor is of slow growth, and the neighboring lymphatic glands are not affected until late. Extension of the disease to surrounding organs is not common and metastases are still more rare. All these factors favor the success of the operation. If a malignant growth be large and of some months' standing, however, particularly if it is adherent, operation is contra-indicated, as it is also in children unless the growth be small and the child otherwise healthy.

Malignant growth of the kidney usually begins in the cortical portion of the organ, and in some cases its origin from the epithelium of the tubules has been demonstrated. The growth may assume a nodular or a diffuse form, and areas of softening are frequently seen scattered in the growth, and the softening may lead to the formation of cavities filled with blood and *détritus*. There is almost always some kidney-tissue left in a more or less normal condition, but more or less wide-spread interstitial nephritis is often present. In primary cancer only one kidney is usually affected.

Metastases are not uncommon, and the order of frequency of the infection of other structures is as follows: Lungs, renal veins and vena cava, lymphatic glands, and liver. The malignant renal tumor is frequently adherent to the surrounding structures, pyelitis is not uncommon, and calculi are not infrequently found in the renal pelvis. The opposite

kidney may undergo hypertrophy, but often it is affected with chronic diffuse nephritis. Approximately, one-third of all cases occur in childhood before the age of ten years, and far more in the first five years of life than in the second. There is no great difference in the frequency with which the two kidneys are affected, but the disease occurs more frequently in males than in females. The average duration of the disease in children is some eight months; in adults it is considerably longer; *i.e.*, two and a half years. Wentworth (Arch. of Ped., May, '96).

Literature of '97-'98-'99.

Malignant tumors of the kidney in childhood occur either congenitally or within the first four years of life; most frequently between one and two years of age. All of them are probably embryonic in origin, as evidenced by the fact that they contain distinctly embryonic tissue. They are very rapid in growth, and are not attended with any destructive systemic symptoms in the first half of their course; in the late period they are accompanied by rapid and great constitutional disturbance. The left kidney is more often affected than the right. There is no sexual variation. Without operation the average duration of life is 8.08 months; with operation it is 16.77 months. George Walker (Annals of Surg., Nov., '97).

Symptoms.—The most important symptom of renal neoplasms is the presence of a tumor, situated in the loin and growing anteriorly. The tumor is smooth and rounded, resists movement on pressure, and does not descend on inspiration. Pain is quite a constant symptom in the case of malignant growths. It is felt chiefly in the loin, but radiates to the scapula and back and to the thigh. Hæmaturia may be a symptom, particularly in case of sarcoma, and is irregularly intermittent. Carcinomatous tumors are apt to be nodulated instead of smooth and rounded, as are most renal tumors. In advanced stages of the dis-

ease fragments of carcinomatous tissue may be passed in the urine. The patient becomes emaciated and cachectic. Hepatic and splenic enlargements are most likely to be confounded with renal tumors.

Diagnosis.—The differential diagnosis is facilitated by noting the resonance of the colon, which crosses the kidneys, but not the spleen or liver. This is assisted by the detection of the notched edge of the spleen or well-defined edge of the liver; and of dullness on percussion over the flanks. Soft, elastic sarcomata may be mistaken for hydronephrosis.

Researches into the literature of renal tumors have served to show that the large intestine does not always lie in front of such growths, but that it may be placed laterally or even retain its normal relationship to the kidney. In analysis of 34 cases of right- and of 27 cases of left-sided renal tumor the percentage frequency of the position of the gut found as indicated in the subjoined table:—

	Normal.	Lateral.	Anterior.
Right	44.12	11.5	44.13
Left	37.02	22.2	40.78

Kofmann (Wiener med. Woch., Nos. 26 and 27, '96).

Literature of '97-'98-'99.

The chief symptoms of renal sarcoma in children are the presence of a tumor behind the colon, rapidly growing, more or less free according to the presence or absence of adhesions; if cysts develop, examination of the fluid is a help in diagnosis. Examination of the urine gives negative or uncertain results; hæmaturia is exceptional. Concetti (Rif. Med., May 9, 10, 11, '98).

Resection of a small portion of renal tissue advocated as a diagnostic measure in cases of kidney disease the nature of which cannot be determined by other means, including exposure and puncture of the affected organ. In many cases of renal disease it is impossible to make a diagnosis of the nature of such disease even after free exposure and palpation

of the kidney. It is only by microscopical and bacteriological examination of altered renal tissue that one can tell whether such alteration be due to inflammation or to a new growth, or whether the appearance of the tissue supposed to be diseased be deceptive, and not due to any morbid change. Bloch (Revue de Chir., June, '98).

Diseases of the Ureters.

EXAMINATION OF THE URETERS.—*Inspection.*—The vesical orifices of the ureters can be seen by cystoscopical examination, but for more extensive examination vaginal or abdominal incision is required. For exposing the vaginal portion of the ureter Kelly makes an incision extending from the vault half-way down through the antero-lateral vaginal wall. The posterior pelvic portion and lower abdominal portion is exposed after abdominal incision by drawing the sigmoid flexure toward the right to expose the left ureter and by lifting the caput coli and drawing it also to the right to expose the right ureter. The abdominal portions are exposed by incising the peritoneum reflected over the ascending or descending colon on the outer side where there are no vessels, and then displacing the colon toward the median line. The ureter will often be found adhered to the peritoneum as it is separated from the abdominal wall.

Palpation.—The pelvic portion of the ureter may be palpated through the vagina or rectum. If the internal iliac artery can be located the ureter will be felt as a flat, yielding cord lying behind and close to it in the upper part of its course. In the lower part of its course it is distinguished by its direction, size, consistency, and mobility. It is said to be sometimes possible to palpate the normal ureter through extremely thin abdominal walls as it passes over the brim of the pelvis. In case the ureter is thick-

ened or if it be distended or sensitive from disease, it can be much more readily found, and it may be possible to palpate it in any part of its course.

Catheterization of the ureters was practiced by Simon, of Heidelberg, in 1875, but with only qualified success. (*Sammlung klin. Vort.*, No. 28; *Gynäk.*, p. 649, No. 88, of entire series.)

It is chiefly through the work of Howard A. Kelly that this most important means of investigation has been simplified and brought into general recognition, and it is not only a means of diagnosing disease of the ureter, but a most valuable aid in determining the exact condition of the renal pelvis or of the kidney, in treating disease of the pelvis of the kidney, and in accurately locating the ureters so that they may be avoided in pelvic or abdominal operations.

A general anæsthetic is not necessary unless the patient is very nervous. After having emptied the bladder the woman is placed in the knee-chest position or in the dorsal position with the hips elevated. In case it is necessary to dilate the urethra, its sensitiveness is first dulled by the introduction of a pledget of cotton saturated with cocaine, then a well-lubricated, conical dilator is inserted with a boring motion until a dilatation of one centimetre in diameter is reached. A cylindrical speculum provided with an obturator is then introduced, the obturator is withdrawn, and air immediately rushes in and distends the bladder.

Light is directed through the speculum into the bladder by a head-mirror and the speculum is withdrawn a little and moved right or left until the ureteral orifices are brought successively into the field. The orifice usually appears as a little transverse slit, with a slight horseshoe-shaped elevation around it, open on the inner

side. Sometimes it appears as a pit or hole in the mucosa or as a rosette with an opening in the centre. If the observation is continued a little jet of urine will spurt from the orifice for a second or two.

The catheter is passed through the speculum until its point rests in the ureteral slit, and it is pushed gently in and toward the side, stopping at once if the slightest resistance is met. The catheter can be introduced even into the pelvis of the kidney and the renal pelvis can be irrigated. Kelly (*"Operative Gynæc."*, volume i, p. 451, '98) has used a flexible ureteral catheter tipped with wax, which is softened by olive-oil, in the diagnosis of calculus in the pelvis of the kidney. The stone makes scratches on the glistening surface of the dental wax which are readily seen with a hand-lens.

Calculi in the ureter are found most frequently at the junction with the renal pelvis; less commonly about the middle and at the entrance to the bladder.

SYMPTOMS.—Calculi in the ureter usually give rise to attacks of renal colic, whether they simply pass without impaction or become arrested in their course. Impacted calculi are apt to give rise to hydronephrosis, particularly if imbedded near the renal pelvis. At times there is pain or tenderness on pressure at some point in the course of the organ. In the lower part of the ureter a stone may sometimes be felt by the finger in the rectum or vagina. A positive diagnosis can often be made only by coeliotomy and direct palpation.

Literature of '97-'98-'99.

Through the roof of the vagina a calculus can be felt at any spot within the last two and a half inches of the ureter. Through the rectum not more than one and a half inches of the ureter is thus under control.

The passage of a calculus along the ureter should be suspected if attacks of pain and hæmaturia and other symptoms suggestive of renal calculus have extended over several days or weeks or months and if, with each succeeding attack, the pain and tenderness on pressure are located lower and lower down along the course of the ureter, and the bladder at length becomes the seat of pain and irritability. So also should suspicion be aroused if, after one or more attacks of typical renal colic, the patient is suddenly seized, after walking or some exertion, with a violent pain shooting along the course of the ureter and followed by settled pain and great tenderness at one particular spot in this course, lasting days or weeks uninterruptedly.

A persistent abdominal tumor due to hydronephrosis has become a recognized symptom of renal obstruction due to calculus, movable kidney, ureteral valve, or ureteral stricture.

Nephrectasis is very apt to occur in those cases in which the calculus is in the upper end of the ureter and from time to time slips back again into the dilated renal pelvis.

The urine may contain some or other of the following deposits: crystals, fragments of calculus, fibrous coagula, blood, blood-casts of the ureter, and pus. In some cases blood and pus have been found together in small or moderate amounts, in others there has been severe hæmaturia, and in others—generally cases of long standing—there have been large discharges of pus.

Prolapse of the ureter into the cavity of the bladder, and in the female even through the urethral orifice as far as the vulva, is one of the rarer effects of calculus impacted in the ureter. Henry Morris (*Lancet*, Dec. 16, '99).

TREATMENT—The treatment of calculi passing through the ureter is that already described under renal colic. In case of impaction incision into the ureter, ureterotomy, is the only means of relief and cure.

Ureterotomy.—In 1879 T. A. Emmet ("Principles and Practice of Gynæcol-

ogy," p. 744, Philadelphia, 1879) reported three cases in which he had found calculi obstructing the ureter; in one case he removed the stone by forceps after opening the bladder and in another he removed a stone weighing 98 grains by incision through the vaginal wall. Since these operations a considerable number of calculi have been removed from various parts of the ureter. Stones impacted in the vesical portion may sometimes be removed with forceps after suprapubic cystotomy has been performed; in other cases a small incision with careful dilatation of the orifice will be necessary. From the lower pelvic portion of the ureter stones have been removed by incision through the vagina and through the rectum, but removal through rectal incision is to be condemned because of the danger of infection.

Stones located higher in the pelvic ureter are removed, preferably after cœliotomy, as the extraperitoneal method requires too extensive denudation. Calculi have been removed from the middle portion of the ureter by both retroperitoneal and intraperitoneal ureterotomy; the retroperitoneal method is the method of choice, exposing the ureter in the way described under examination of the ureter. The upper part of the ureter is reached in the same way as the kidney. In some cases in which the stone is lodged high up it may be possible to push it up into the pelvis of the kidney.

Stricture and Valvular Obstruction.—

The symptoms of this condition are those due to interference with the free flow of urine. Hydronephrosis accompanied by more or less pain has been present in the cases thus far reported; decomposition of the urine, with irritation of the bladder and frequent micturition is common.

TREATMENT.—Kelly has seen great improvement follow gradual dilatation by graduated hollow bougies in cases of stricture. Ureterotomy and division of the valve or, in case of stricture, closing the opening after the Heinecke-Mikulicz method of suturing the pylorus has been successful in relieving these conditions in a number of cases. Resection and anastomosis or suturing the ureter into the lower part of the infundibulum is sometimes necessary.

General Surgery of the Kidneys.

When operative procedures are about to be performed on the kidney, the fact that it is occasionally the seat of anomalies should be borne in mind. It may occupy an abnormal position; under such circumstances it will usually be found below and nearer the middle line than usual. It may even be found as low as within the pelvic cavity. Irregularities of size and shape may also be found, due to abnormal or arrested development.

Sometimes the extremities fuse, forming "horseshoe kidney" or one kidney may be wanting, in which case the other is apt to be of unusual size. A number of cases of congenital occlusion of the ureter have been reported in which it was, of course, impossible for the kidney to fulfill its function.

Nephrotomy.

Nephrotomy is an incision into the kidney, but the term is now generally limited to incisions for the evacuation of cystic or purulent collections of fluid.

INDICATIONS.—It may be indicated in simple cysts, hydronephrosis, hydatid cysts, pyonephrosis, suppurative nephritis, and tuberculosis of the kidney.

In all of these conditions pus and blood will be found in the urine. The amount of blood is generally small and the cells are abnormal; the pus, if measured, is

apt to vary in amount. Renal cells and the characteristic epithelium of the pelvis of the kidney will also probably be found. In all chronic inflammatory conditions casts and albumin are present in the urine. Elevation of temperature, with or without chills, loss of appetite, hectic, suppression of urine, and uræmia may also exist. There will be more or less pain and tenderness over the region of the kidney and in pyelonephritis and pyonephrosis there may be considerable swelling, redness, and œdema. The symptoms of pyonephrosis are those of hydronephrosis plus those of suppuration.

SIMPLE CYSTS of the kidney begin in the renal cortex and grow toward the surface without affecting the renal tissue, unless they grow to great size, when they may cause pressure-atrophy. They are thin-walled, globular, and of varying size; and they contain a pale, straw-colored, albuminous fluid of low specific gravity. They sometimes contain cholesterolin or blood, and rarely the contents are thick and jelly-like. They usually cause no symptoms except those of a growing, cystic tumor in the loin.

HYDATID CYSTS are found more frequently in the kidney than in any other organ except the liver, but are six times less frequent than in that organ. They are usually situated in the secreting substance and tend to rupture into the pelvis without reaching great size. Thinning and atrophy may result, however, from pressure. They may be secondary to hydatid disease of other organs.

Symptoms.—In some cases a tumor may be felt on palpation, and fluctuation may be perceptible; hydatid fremitus, as observed in other organs, is rare. If the cyst ruptures into the renal pelvis, the passage of vesicles through the ureter gives rise to symptoms of renal colic.

The presence of vesicles and hooklets in the urine would confirm the diagnosis. Blood and pus may also escape with the hydatids.

HYDRONEPHROSIS is a distension of the kidney with fluid, caused by an obstruction to the outflow of urine.

Symptoms.—A tumor, rounded or lobulated in form and often fluctuating, may usually be felt in the lumbar region. In case this tumor diminishes in size or disappears at times, especially if the diminution or disappearance is accompanied by a profuse flow of urine of low specific gravity, the diagnosis is almost certain. Severe cases may be accompanied with suppression of urine, and, in case both kidneys are affected, uræmia will occur sooner or later. Pain is a variable symptom; it is influenced by the tension and may be wanting.

Etiology.—Its causes are congenital or acquired. Nearly one-third of all cases are said to be due to some abnormal condition of the ureter: impacted calculus, kinks, twists, stenosis, or compression from some abnormality of adjacent structures such as tumors of the abdominal or pelvic organs. Floating kidney is a frequent cause of kinks of the ureter. Among other unusual causes have been mentioned enlarged prostate, phimosis, and retroflexion of the uterus. The fluid within the cyst is never pure urine, frequently containing neither urea nor uric acid: it is usually a clear fluid of low specific gravity containing chlorides and albumin; sometimes it is brownish from the presence of blood; it may be putrid and ammoniacal; rarely it is thick and jelly-like.

PYELITIS and **PYELONEPHRITIS** both occur most frequently as the result of secondary infection from some disease lower down in the genito-urinary tract. If the infection is confined to the pelvis

of the kidney it is known as pyelitis; if the kidney-substance is affected, pyelonephritis, and in its typical form it is usually called "surgical kidney." Both kidneys are generally affected, and gonorrhœa is the ordinary cause of the infection. Calculus is also a very common cause of these conditions; or a calculus may form as a result of the inflammation.

PYONEPHROSIS.—The suppurative processes in a case of pyelonephritis may go on until the greater part of the kidney-substance is destroyed and only a sack filled with pus remains; this condition is known as pyonephrosis. An after-development of suppuration in a case of hydronephrosis produces the same result.

RENAL ABSCESS may result from traumatism, renal calculus, or it may be pyæmic or metastatic in origin. Abscesses of the kidney are located in the cortical substance. They frequently empty through the pelvis of the kidney or they may rupture the capsule, giving rise to a perinephritic abscess in the surrounding cellular tissue. In case there are several abscesses the septa between them may break through, giving rise to pyonephrosis.

TUBERCULOSIS OF THE KIDNEY is, in the majority of cases, associated with tuberculosis in other organs. The kidney is enlarged, sometimes very considerably, and cheesy masses are seen in the secreting substance. This condition was formerly known as scrofulous kidney.

Symptoms.—There is usually tenderness and swelling in the loin, accompanied by dull aching or dragging pain. Pus is almost invariably found in the urine in large amount; blood is commonly present; and in many cases tubercle bacilli may be demonstrated. Vesical irritation and tenesmus are said to be very constant symptoms, and are thought

to be due to tubercular deposits about the lower end of the ureter and in the bladder-wall. Irregular elevations of temperature, rigors, and sweating occur, and there is loss of flesh and strength. The history and hectic character of the temperature would be of aid in the differential diagnosis from other suppurative affections of the kidney; the finding of tubercle bacilli in the urine would be almost absolutely diagnostic.

PERINEPHRIC ABSCESS in most cases results from the extension of suppurative processes in the kidney itself, but it may follow operative intervention or inflammatory processes in neighboring organs. Not seldom it arises from a local infection of the perinephric tissues.

The abscess tends to burrow along the sheaths of muscles and under the fasciæ of the lumbar region, usually reaching the surface, but sometimes following the sheath of the psoas to the inguinal region, or finding its way through the diaphragm or rarely bursting through the peritoneum.

The symptoms are those of deep-seated suppuration in this region, but the condition is apt to be of particular gravity because of the debilitated condition of the patient from the previous renal suppuration and the highly-poisonous character of the mixed pus and urine. The diagnosis may be confirmed by the use of an aspirating needle.

In any of the above conditions the operation *may* be indicated. Small cysts are frequently found in granular kidneys, however, which never demand surgical treatment, and in case pathological changes are far advanced in any of these conditions the operations of resection or nephrectomy may offer the patient the best chance of recovery. Puncture of the kidney and aspiration of the contained fluid is recommended by some surgeons

in the treatment of cysts and hydronephrosis, but, if successful, the procedure has to be frequently repeated in most cases and it very often fails to produce a cure or gives rise to infection.

[Tillmanns ("Specielle Chirurgie," vol. ii, p. 227, '96) believes that incision should be substituted for puncture, and unfavorable mention by several other writers would seem to indicate that this judgment is sound. W. W. KEEN and M. B. TINKER.]

The indications are more positive when there is suppuration in and around the kidney; incision, evacuation of the pus, and drainage are necessary. When the diseased condition has advanced so far as to call for nephrectomy, but in which the strength of the patient is much exhausted, incision and drainage is often followed by such gain in strength and improvement of the patient's general condition as will permit of the successful performance of the more serious operation at a later date. In tuberculosis of the kidney, simple nephrotomy with removal of diseased tissue may be all that is needed; but nephrectomy is often necessary.

Double lumbar nephrotomy performed for congenital hydronephrosis at the twenty-second hour after birth. The child, several weeks after the operation, was still living and passing all its urine through the lumbar fistulæ. Henry Morris (*Lancet*, Jan. 27, '94).

In simple pyonephrosis, nephrotomy performed in 9 cases with one death. Certain well-known reflex phenomena may follow upon operations on the kidney (nephrorrhaphy, nephrotomy, nephrolithotomy), namely: uncontrollable vomiting, with pain and tenderness in the epigastrium and loins; the patient is pale and anxious, the pupils contracted, the pulse small and rapid, and the temperature at or about normal. These symptoms may disappear after twenty-four or thirty-six hours, or they may continue without abatement; and,

should the case terminate fatally, no explanation of the phenomena is to be found on the most careful post-mortem examination. Albarran (*Rev. de Chir.*, Nov. 10, '96).

Literature of '97-'98-'99.

Catheterism of the ureter strongly advocated for the cure of hydronephrosis; and, if that fail to empty the kidney, the catheter should be left in and the organ explored by operation. By means of the instrument, the seat and nature of the obstruction may be ascertained, and then uretero-pyelostomy can be performed with relative ease.

Nephrectomy should never be the first step in pyonephrosis. As a rule, the general health of the patient and the condition of the opposite kidney contraindicate this operation, and nephrotomy is the right course. Should it be found advisable later, when health is restored, to remove the kidney, secondary nephrectomy can be done under better conditions. A retained ureteral catheter will greatly shorten the duration of a nephrotomy fistula. Albarran (*Gaz. Méd. de Paris*, Sept. 11, '97).

One hundred and thirty-five cases of operation for renal tuberculosis of which 27 died (operative mortality, 20 per cent.). Remote results: No record of 19 cases. Of 89 cases, 40 died within 9 months (general mortality, 29.63 per cent.); 45 cases lived from 1 to 8 years ($33\frac{1}{3}$ per cent.). "Total surviving and promising cases," 76, or 56.3 per cent. L. Bolton Bangs (*Annals of Surg.*, Jan., '98).

When once the conclusion is reached that a kidney is the site of a tuberculous lesion, the sooner that organ is removed the better, provided only that in the other kidney or elsewhere no lesion of a similar character be present. Roswell Park (*Jour. Cut. and Genito-Urin.*, Dis., Aug., '98).

Operation.—Before all operations of probable gravity examination of the urine is advisable, and if possible the condition of the other kidney should be determined. In order to lessen the dan-

ger of infection from the micro-organisms which are commonly found, even in healthy kidneys, Kocher ("*Chirurgische Operationslehre*," dritte Auflage, p. 160, '97) recommends the administration of 3 grammes (45 grains) of salol a day for several days before the operation.

The usual incision for exposing the kidney (described above) is generally the best. In cases of great enlargement, however, it may be more convenient to make the opening farther forward. In operating for cysts or for hydronephrosis the tissues may be found normal, with the exception of a thinning of the perinephric fat; but in suppurative processes the skin, muscles, and fasciæ are likely to be found vascular and œdematous, and the perinephric fat dense and adherent. A sufficient surface is usually denuded to permit of its being brought to or near the level of the skin, where it is sutured after being opened. Any curdy or stringy material which may be found within abscesses should be curetted away and if there are septa between abscesses they should be broken down. After thorough disinfection of the wound a thick drainage-tube is inserted, the wound is partly closed, and a heavy absorbent dressing applied.

Simple cysts often close primarily, the cavity of an hydatid cyst usually closes after suppuration, and there are a good proportion of cures following nephrotomy for abscess. After operations for hydronephrosis, fistulæ are often left that will not close without a plastic operation or, in some cases, nephrectomy. Resection or nephrectomy is frequently called for after nephrotomy for tubercular kidney.

Literature of '97-'98-'99.

New method of nephrectomy described. The incision of Langenbuch is first made; the hand is passed into the

belly and the other kidney is examined. The peritoneal layer of the abdominal cut is sutured. A transverse lumbar incision is then made, bisecting Langenbuch's incision. The kidney is reached, the fingers are inserted between the peritoneum and transversalis fascia, the flap thus loosened is turned down, and the peritoneum can now be raised from the kidney. M. McArdle (Dublin Jour. Med. Sci., Jan. 1, '98).

Nephrectomy.

Removal of the kidney may be indicated in cases of renal tumor; severe injuries accompanied by serious hæmorrhage, suppuration, or infiltration of urine; renal or ureteral fistulæ; diseased movable kidney; tuberculosis of the kidney, hydronephrosis, calculus, cysts, and suppurative processes in which resection seems unlikely to relieve or cure.

INDICATIONS.—But few well authenticated cases are on record in which this operation was undertaken for injuries of the kidney. Nasse (Berl. klin. Woch., Aug. 22, '96) was only able to find nine cases with seven recoveries. While a successful result may follow without intervention, operation has no doubt often been delayed until too late. Severe hæmorrhage—as evidenced by bloody urine, acute anæmia, and the physical signs of fluid in the abdominal cavity—is an indication for immediate exploratory operation. The same is true in the event of severe secondary hæmorrhage, which sometimes occurs as the result of the rupture of a traumatic aneurism. It is often difficult to decide what to do if the bleeding is less copious, but in any case operation should not be deferred until the patient is too weak and anæmic. In the less severe cases the lumbar incision will answer; in graver injuries the extraperitoneal incision from the tip of the twelfth rib to the junction of the middle and outer thirds of Poupart's ligament will give more room and seems

more generally applicable; cœliotomy is called for in case there are signs of hæmorrhage into the abdominal cavity. The ligation of vessels and suturing or the use of the tampon followed by suture may be sufficient in less severe injuries, but nephrectomy is indicated in case a main branch of the renal artery is injured or if there is very extensive laceration and contusion of the renal substance.

The conditions under which nephrectomy is indicated—for renal calculus, hydronephrosis, tuberculosis, cysts, and suppurative processes—have already been discussed.

Ureteral fistulæ, which usually are due to wounds inflicted during operations on the abdominal or pelvic viscera, may necessitate nephrectomy, but the operation seems indicated only in case there is great discomfort or the patient is prevented from following a necessary occupation. In most cases it would probably be possible to perform a plastic operation on the ureter or, failing in this, to implant the end of the ureter into the rectum.

Operation.—As a preliminary to the removal of a kidney measures should be taken to determine as definitely as possible whether another kidney exists and whether it is sound or diseased. Numerous devices have been suggested for the purpose of collecting the urine from each kidney separately, many of them depending upon the compression of the ureter by various means, but none of them have proved entirely satisfactory. The catheterization of the ureters (see AFFECTIONS OF THE URETERS) is the most certain method of obtaining separate urines, but much special skill is required for its successful practice. Moreover, practically its usefulness is restricted to women. M. L. Harris (Jour. Amer. Med. Assoc., Jan. 29, '98) has devised an ingenious instru-

ment which has been used with satisfactory results in a number of cases. Its essential features are: a blade which can be introduced into the rectum or vagina and elevated so as to make a water-shed between the ureteral orifices, and a double catheter, the tubes of which are so hinged that after introduction into the bladder they can be separated and turned down one on each side of the septum formed by the rectal blade; the urine from each side of the water-shed is carried by them to separate bottles.

In some cases it may seem necessary to lay both kidneys free by lumbar or abdominal incisions to determine the presence of both kidneys or the extent of disease in them, as recommended by Edebohls (*Annals of Surg.*, xxvii, p. 425, '98).

The kidney may be removed either through a lumbar or an abdominal incision. Abdominal nephrectomy is usually reserved for those cases in which there is great enlargement of the kidney and for cases of injury in which there is hæmorrhage into the peritoneal cavity. The lumbar incision gives better opportunity for the separation of adhesions, it is extraperitoneal, and permits freer drainage of abscesses if necessary without serious danger of peritonitis, and the general mortality is considerably less than after abdominal nephrectomy.

Lumbar Nephrectomy.—The length and direction of the incision depend to some extent on the condition of the organ to be removed. In case the kidney is of normal size or but slightly enlarged and is not adherent, the vertical or oblique incision as described under movable kidney could be used. The incision suggested by König, beginning half an inch below the last rib near the outer border of the erector spinæ and continued first downward toward the crest

of the ilium, then curving forward toward the umbilicus, would give much more space for the removal of an enlarged or adherent kidney.

Bergmann carries his incision from the last rib posteriorly downward and forward to the middle third of Poupart's ligament. Kocher uses this form of incision and finds it possible through it to examine the other kidney or the under surface of the liver with his hand in the abdominal cavity. After determining that the other kidney is sound he sews together the opening in the peritoneum and proceeds with the removal of the diseased kidney.

The structures divided and their relations have already been described under movable kidney. It is generally possible to separate the peritoneum from the surface of the kidney and to push it inward. The organ is then freed from its bed and the larger vessels going to the capsule are tied. Dense adhesions are divided by scissors, but in some cases they may cause so much difficulty that it will be easier to enucleate the kidney from its capsule rather than to separate it from the circumrenal fat. After it is freed the organ is luxated from its bed, care being taken not to make much traction on the pedicle; the structures at the hilum are isolated, a strong silk ligature is passed about the vessels by an aneurism-needle and tied; the ureter is separately doubly ligated and tied, and the pedicle divided. If the ureter contains infectious material it may be divided with the thermocautery. After the pedicle has been carefully inspected in the wound and all bleeding points have been secured a large drainage-tube is placed in the bottom of the cavity and the wound is partly closed by deep and superficial sutures.

Abdominal Nephrectomy.—Various in-

cisions have been used: an oblique incision directly over the kidney is recommended by Kocher; an incision through the linea semilunaris is advised by Langenbuch; that through the outer border of the rectus abdominis is preferred by Greig Smith; or the route through the linea alba may be chosen. An incision in or near the median line will facilitate the exploration of the alternate kidney in case manual examination seems necessary, while the removal of an adherent kidney would be easier through the lateral incision. After opening the abdominal cavity the kidney is exposed by tearing through the peritoneum forming the outer layer of the mesocolon, as its inner layer contains the vessels which supply the bowel, and their division might give rise to gangrene of the intestine. The freeing of the kidney from its bed and the isolation and ligation of the vessels and ureter are then carried out in much the same manner as in lumbar nephrectomy.

The mortality of nephrectomy varies with condition of the patient and the pathological condition for which the operation is undertaken. The prognosis in operations for malignant disease, after which nearly 70 per cent. die: The proportion of deaths after operations for tuberculosis of the kidney is about 36 per cent.; recent statistics place the mortality at about 25 per cent. in case of traumatic lesions; the general primary mortality in all cases of nephrectomy is from 35 per cent. to 40 per cent.

Operations on malignant growths so far done 150 times with mortality of 50 to 66 per cent. before 1890, and 20 to 25 per cent. since. Seventeen cases have lived a year or more after operation. Many died of recurrence at subsequent date. Large mortality due to tardy diagnosis. When palpable tumor only symptom, early diagnosis difficult or impossible. When hæmaturia and palpable

tumor, diagnosis from renal colic difficult. Hæmaturia without palpable tumor, diagnosis made by microscope; urine deposits yellowish-gray granular matter, round or spindle cells. Rösing (Archiv f. klin. Chir., B. 49, H. 2, '95).

Literature of '97-'98-'99.

Operative treatment in malignant tumors of kidney in childhood, to be successful, should be instituted as early as possible. Operation is followed by an immediate mortality of 38.25 per cent., an ultimate one somewhere between 74.32 and 49.53 per cent.; 5.47 per cent. of cures; and a lengthening of life by 8.08 months. George Walker (Annals of Surg., Nov., '97).

Resection of a Part of the Kidney.—

The first partial excision was performed by Czerny in November, 1887, for an angiosarcoma. The operation has been rather rarely resorted to, although there seems to be no doubt that it is a sound surgical procedure and that it is an important advance in the conservative surgery of the kidney to substitute this operation for total nephrectomy when only a part of the kidney is diseased or has been injured.

Abscess-cavities or caseous tuberculous deposits may be scraped out and packed with iodoform gauze or diseased areas or tumors may be excised and the cut surfaces of the kidney sutured.

Bloch reported a case and gave abstracts of ten others which he had collected from French and German literature at the meeting of the British Medical Association in 1896. Morris includes in his tables of his own operations ("The Origin and Progress of Renal Surgery," London, '98) six cases of partial resection. In all of the cases reported by these operators recovery followed. Subsequent nephrectomy was necessary in three cases and renal fistula resulted in one case.

NEPHROPEXY, OR NEPHRORRHAPHY, AND NEPHROLITHOTOMY, being only indicated in special disorders, are described above under the heading of the latter.

Surgery of the Ureters.

Ureterectomy.—The term has been applied not only to the total extirpation of the ureter, but to resections of more than two or three inches of this organ. The operation is indicated in certain cases of tuberculosis of the ureter, hydrops of the ureter, suppuration in a dilated ureter, and in case of lumbar fistula due to the presence of a diseased ureter after nephrectomy has been performed.

The operation may be primary, when the ureter is removed simultaneously with the kidney; or secondary, when the ureter is removed by a subsequent operation. The extraperitoneal method is usually chosen, through the incision described under methods of examination.

Uretero-Ureteral Anastomosis.—This operation is employed to restore the continuity of the duct after accidental division or division during abdominal or pelvic operations; after resection for stricture, ulceration, or sloughing caused by any cause particularly calculus; and after rupture or other injuries due to external violence.

Four methods have been successfully used: direct end-to-end anastomosis; Poggi's end-to-end invagination of the upper into the lower portion of the ureter; oblique end-to-end anastomosis as practiced by Bovée; and lateral implantation, as suggested by Van Hook. End-to-end union has been performed seven times with four cures and three deaths due to other causes than the ureteral operation. Van Hook's method has been used successfully in three cases, by different operators in each case. It is most readily and rapidly performed and is the operation which is now gen-

erally preferred. Bovée's method might be employed in case there was great loss of substance. In case more than a third of the circumference of the duct is involved by an injury division and anastomosis would be the preferable method of treatment.

By *Van Hook's method* the lower end of the ureter is ligated and a longitudinal incision twice as long as the diameter of the ureter is made in its wall $\frac{1}{4}$ inch (6 millimetres) below the ligature. The upper end is slit up $\frac{1}{4}$ inch (6 millimetres) and two very small sewing needles threaded on one fine suture of sterilized catgut are passed through its wall from within outward, $\frac{1}{8}$ inch (3 millimetres) from its extremity, and $\frac{1}{16}$ inch (1.5 millimetres) apart. These needles are carried through the slit in the lower end of the ureter into and down the tube for $\frac{1}{2}$ inch (13 millimetres), and are then pushed through its wall side by side. By traction on the catgut loop the upper end of the duct is drawn into the lower portion and the ends of the loop are tied. Although catgut was originally used because its early absorption lessened the danger of the formation of calculus, silk is to be regarded as a safer suture material and no bad results have been reported from its use.

The site of the union is then enveloped in peritoneum, which is stitched in place about it.

Literature of '97-'98-'99.

Conclusions regarding utero-ureteral anastomosis are: 1. Uretero-ureteral anastomosis is a perfectly feasible procedure. 2. Uretero-ureteral anastomosis, whenever possible, is far preferable to any other form of ureteral grafting, to nephrectomy, and to ligation of the ureter. 3. It should be done preferably by lateral implantation or by oblique end-to-end anastomosis, though the transverse end-to-end or the end-to-

end methods may be safely employed.

4. That constriction of the calibre of the ureter does not usually follow attempts at suturing in closure of complete transverse section of the duct. 5. That nephrectomy for transverse injuries of the ureter, *per se*, is an unjustifiable operation. 6. That simple ligation of the ureter to produce extinction of the function of the kidney is too uncertain to justify its practice. 7. That drainage is not necessary if the wound be perfectly closed and the tissues throughout are aseptic. J. Wesley Bovée (Annals of Surg., Jan., '97).

Ureteral implantation into the bladder, into some portion of the intestine, and on to the skin have been suggested by many operators and by numerous methods. Such operations are undertaken for the cure of ureteral fistulæ, the prevention of fistulæ in case too great injury has been done to the ureter to permit of anastomosis, in case of ectrophy of the bladder, and for uretero-uterine and uretero-vaginal fistulæ.

In cases of uretero-vaginal fistulæ Kelly recommends making a vesico-vaginal fistula near by, then inclosing both fistulæ in a circular denudation and suturing the sides together.

Uretero-cystotomy.—In this procedure the abdomen is opened and the end of the ureter is freed. An incision is made at a suitable place in the bladder-wall; long forceps are introduced into the bladder through the urethra and are used to pull the ureter through the bladder incision, into which it is sutured by fine-silk interrupted sutures.

Implantation into the bowel has been performed many times, but infective nephritis has so frequently resulted that the operation is not generally recommended. Fowler (Amer. Jour. Med. Sci., Mar., '98, vol. cxv, p. 270) describes a new method by which he operated successfully on a boy, 6 years old, for ex-

strophy of the bladder. After opening the abdomen and isolating the ureters, a longitudinal incision 7 centimetres long was made on the anterior wall of the rectum through the serous and muscular coats; the coats were dissected back until a diamond-shaped space on the submucous coat was exposed. A tongue-shaped flap with its base upward was cut in the mucous membrane of the lower half of the diamond. The flap was doubled up, approximating the submucous surfaces and secured with sutures; thus, a flap-valve was secured, both sides of which are covered with mucous membrane. The ureters were then placed in the incision with obliquely-cut ends, presenting on the external surface of the flap, and were secured by a few stitches in the upper half of the diamond; the flap with the attached ends of the ureters was then pushed into the rectum. The gap in the mucous membrane was closed by catgut sutures and then the original wound in the rectal wall was closed by fine-silk sutures. The valve-flap and compression of the circular muscular fibres of the rectum combine to prevent the passage of feces into the ureter during defecation.

Literature of '97-'98-'99.

In implantation of the ureters in the rectum the principles of personal method are: 1. The ureters empty into the bowel in the direction of its length and from above downward so that the urine is discharged in the direction taken by the faecal current. 2. The ureters are buried longitudinally in the walls of the rectum for the distance of an inch or more, so that in the act of defecation the faecal mass will squeeze the calibre of the ureters closed by its pressure on the mucous membrane, and so that pressure is exerted from above downward in the direction of the onward flow of the urine. 3. The ureters are further protected by the muscular coat of the intestine, by

being surrounded by the circular fibres of the bowel, which hold the ureters closed during defecation. After the pressure of the faecal mass and of the circular muscular coat is removed, urine retained in the ureters will spurt forth with considerable force, acting as its own cleanser. 4. The implantation is in the lower bowel, which is normally empty save during defecation. The operation is performed with the patient in the Trendelenburg position. The ureters are approximated by fine-silk sutures and the implantation into the bowel is made when the latter is completely empty and secured above the seat of operation by a clamp. The ureters are secured to the fibrous and mucous coats of the bowel by a number of closely-applied sutures of fine catgut or of silk, great care being necessary not to penetrate to the mucous coat of the ureter or to apply sutures so as to constrict the ureters. F. H. Martin (*Jour. Amer. Med. Assoc.*, Jan. 28, '99).

Injuries of the Ureter.—Aside from the wounds which occasionally occur during surgical operations, injuries of the ureter are exceptionally rare. Three classes of injuries have been reported: subcutaneous injuries by indirect violence through the unbroken abdominal wall, injuries from penetrating wounds of the abdomen, and wounds inflicted during surgical operations. Morris (*"Origin and Progress of Renal Surgery,"* p. 146, London, '98) gives abstracts of eleven cases, out of the twenty-three which have been reported as subcutaneous injuries of the ureter, which he believes may be considered well-authenticated cases.

SYMPTOMS.—In some cases there is hæmaturia, which is usually slight and transient. If the rupture has not also torn into the peritoneal cavity, a tumor forms due to the escape of urine into the areolar tissue. The fluid aspirated from such tumors has the characteristics, more or less pronounced, of urine. As soon as the urine and blood begin to decom-

pose, inflammation and suppuration, with their attendant symptoms, occur. When the injury communicates with the peritoneal cavity, symptoms of peritonitis, which is usually fatal, occur.

Literature of '97-'98-'99.

If there is at first little or no hæmaturia and no swelling in the loin, and then after three or four weeks, more or less, a swelling forms behind the peritoneum, rupture of the ureter may be suspected. If, many months or even years after an injury in the region of the ureter, a tumor of the kidney is formed, though there has been an absence of symptoms or only slight hæmaturia at the time of the injury, there will be ground for suspecting traumatic contraction or occlusion of the ureter.

It is, however, impossible to distinguish injured ureter with extravasation, from injured renal pelvis with extravasation; injured ureter with complete obstruction by clot or recurved ends is equally indistinguishable from injured kidney with clot plugging the renal pelvis or the ureter.

Some assistance may, perhaps, be obtained, where an opening in the ureter is believed to exist, by distending the bladder with water. Kammarer found that the water escaped by the defective ureter until the bladder was quite distended, and then, doubtless through closure of the valvular entrance in the bladder, the water ceased to flow. Le Fort and Page applied this test in their cases, but without effect.

Tuffier thinks that a constant escape of urine after a wound of the ureter is the leading distinction between these injuries and wounds of the kidney.

In cases of injury of the ureter not complicated with other serious injuries, the immediate effect of these accidents is not to endanger life, if the peritoneum is uninjured. If prompt and decided surgical treatment were adopted, the consequences to the kidney itself would be less unfavorable; and subsequent nephrectomy would probably be less frequently required than has been the case hitherto.

When the peritoneum is involved the outlook is most serious. Henry Morris (Edinburgh Med. Jour., Jan., '98).

TREATMENT.—The ideal treatment is immediate suture or anastomosis, but unfortunately the exact injury is not usually recognized until some time has elapsed and the peritoneum has become infected or a retroperitoneal cyst has formed. In case a cyst has formed, puncture may be tried, but the result is uncertain. Lumbar incision with evacuation of the extravasated fluid and drainage offer the most favorable conditions for repair. Wounds of the ureter usually heal ultimately without suture, although, if the injury be found, it should be repaired. Nephrectomy will be required if there is evidence of extensive suppuration, septic nephritis, or a permanent fistula that is a source of intolerable discomfort.

Literature of '97-'98-'99.

In cases in which the ureter has been cut through, the proper treatment consists in implantation of the proximal end of the ureter into the bladder. When this is not possible, owing to the high situation of the injury, the next resort is extirpation of the kidney on that side. R. Füh (Centralb. f. Gyn., July 16, '98).

Every operator of wide experience has occasionally injured the ureter. Martin had 2 cases in 202 total extirpations. F. von Winckel estimates 17 injuries in 774 total extirpations of the uterus. Robinson, 3 in 100. Personal average is 1 in every 500 abdominal sections for all causes.

Should the injury escape notice at the time and a fistula result, there are a number of ways to deal with it; if the fistula is vaginal the ureteral opening may be diverted into the bladder by (1) one of the several vaginal operations; (2) the abdomen may be opened and the ureter turned into the bladder; (3) the ureter may be anastomosed into the bladder by the extraperitoneal method; (4) the bladder may be opened from above, the ureter exposed and sutured into the

bladder; (5) the kidney may be extirpated. Howard A. Kelly (Amer. Gyn. and Obstet. Jour., June, '98).

The ideal treatment for subcutaneous rupture, whether in a longitudinal or transverse direction, is immediate suture or anastomosis of the ureter. A free incision in the ilio-costal space will secure the complete evacuation of the extravasated fluid; and drainage will obviate the reaccumulation of urine subsequently escaping through the ruptured tube. If the ureter is completely torn asunder, and its ends can be approximated, they should be united by one of the recognized methods of ureteral anastomosis. If its ends cannot be joined together, then a permanent fistula, opening on the loin, is the result to be expected. Nephrectomy will be required, if pus in the extravasated fluid, continued high temperature, or recurring pyrexial attacks, with pain, loss of appetite, and emaciation, make it clear that the kidney or the retroperitoneal tissue is the seat of extensive suppuration. Nephrectomy may be demanded also in the absence of suppuration, if a permanent fistula has resulted and is a source of intolerable discomfort to the patient. Henry Morris (Edinburgh Med. Jour., Jan., '98).

W. W. KEEN,

M. B. TINKER,
Philadelphia.

URINARY SYSTEM, SURGICAL DISEASES OF (CONTINUED).

Diseases of the Urethra.

Anomalies of the Urethra.—The roof of the urethra may be absent, *epispadias*; or the floor may be deficient, *hypospadias*. The condition of epispadia is associated with exstrophy of the bladder. These conditions are not infrequent, hypospadias, however, being the more common.

Congenital narrowing or occlusion of the urethra and entire absence of the canal are of such rare occurrence that their consideration is almost superfluous. Narrowing, or atresia, should be treated in the same manner as acquired strict-

ures in the same situation. Occlusion is most often due to a thin membrane, which may be broken through with a bougie. If firmer and of greater extent, it may be divided by means of an appropriate knife, or by external incision, either with or without suprapubic cystotomy, and retrograde catheterism, according to the situation and extent of the obstruction.

Injuries of the Urethra.—Wounds of the urethra may be produced from without or within. Punctured wounds from without will probably require a permanent rubber catheter for some days and the ordinary treatment of the external wound. Full-sized urethral bougies should be passed at intervals subsequently to prevent undue contraction of the scar.

External lacerated wounds, involving the urethra, require a permanent catheter. The urethra should be united over this with fine catgut sutures if possible. The external wound should be allowed to heal by granulation usually. Exceptionally, clean wounds in favorable condition may be closed by primary suture. Careful suturing of the urethra will do much to prevent the formation of a troublesome stricture. At the end of a week or ten days the catheter may be removed, after which a steel bougie of appropriate size should be introduced at regular intervals.

Injuries of the urethra produced from within, usually false passages caused by attempts at passing metal instruments in cases of stricture, require antiseptic irrigations of the urethra, and the internal administrations of urinary antiseptics.

Rupture of the Urethra.

This occurs chiefly either behind an old tight stricture or from a fall in which the patient alights astride some sharp object, such as the edge of a board or a

rail. Rupture of the urethra from fracture of the pubic bones, from "breaking" chordee, and from other forms of injury is of less frequent occurrence.

Symptoms.—The cases due to stricture must be considered separately from those due to the other causes mentioned. Usually a small, painful swelling will appear at some point along the course of the urethra. This may remain localized, forming an abscess, or it may give rise to a rapidly-spreading cellulitis, accompanied by the usual signs of inflammation. Urine will be passed with difficulty and in a very small stream or there may be complete retention. Upon inquiry it will be found that the stream of urine has been gradually diminishing in size, and that it has been passed with increasing difficulty.

Rupture of the urethra from alighting astride a sharp object or from fracture or even disjunction of the pubes takes place in the membranous portion. Those cases due to the irrational practice of breaking of the penis for the supposed cure of chordee and to other rare forms of trauma occur in the pendulous urethra.

Pain, hæmorrhage, and retention of urine are the common symptoms in these cases. Swelling and ecchymosis may or may not be present, depending at first upon the nature of the accident and later upon whether there is extravasation of urine or not. The pain is usually not severe. Bleeding from rupture in the pendulous urethra always appears at the meatus. That which takes place from injuries to the membranous urethra may also appear at the meatus or flow back into the bladder and give rise to hæmaturia. Retention of urine may be complete from the moment of the accident and dependent upon an extensive laceration, or after some hours, as a result of

swelling and blood-clot. If the case is not seen early, and a permanent catheter introduced, extravasation of urine will probably occur at the point of the rupture, and with a rapidly-spreading cellulitis.

Treatment.—In examining a patient who has had an injury or condition which could give rise to rupture of the urethra, the parts should be inspected for any external evidences of injury. Inquiry should be made as to the appearance of blood at the meatus and whether urine has been voided. If there are signs of rupture of the urethra, an attempt should then be made to pass a soft-rubber catheter of medium size. Preparatory to this the glans and prepuce should be cleansed thoroughly. The catheter, having been boiled previously, should be connected with a fountain-syringe containing an antiseptic solution, then oiled in carbolized vaselin or other suitable lubricant, the solution permitted to pass for a moment, and finally it should be slowly introduced into the urethra with great gentleness, the fluid meanwhile being allowed to flow.

The urethra is thus thoroughly irrigated, the fluid escaping around the catheter. Among the antiseptic fluids appropriate for this purpose may be mentioned a solution of potassium permanganate, 1 part in 5000; bichloride of mercury, 1 part in 10,000; or carbolic acid, 1 part in 500; and boric-acid solution, 10 or 15 grains to the ounce of sterile water. If the catheter passes into the bladder easily, the urine should be withdrawn and the catheter removed. The patient should be thus catheterized about every six or eight hours. If the catheter passes with great difficulty and only after repeated efforts, it should be allowed to remain, being securely held

by any appropriate means. If the catheter fails to pass the point of rupture, other sizes may be tried as well as other forms. The Nélaton catheter is a very useful form, the point being kept on the roof of the urethra, which in partial tears is less apt to be involved than is the floor. If a catheter enters the bladder it should be allowed to remain.

If no catheter whatever will pass into the bladder, a metal bougie or other firm instrument should be introduced until it is arrested. The point of the instrument should then be exposed by an incision in the middle line. The tip of the instrument will guide the operator to the distal end of the torn canal and the proximal end should then be sought for. When found, a soft-rubber catheter should be passed into the bladder from the meatus, and the divided urethra sutured with fine, chromicized catgut, if at all possible. In searching for the proximal end of the urethra very careful search should be made in the wound before much dissecting has been done, as this would tend to add to the difficulty of locating it. When the usual means fail, pressure above the pubes will frequently cause a few drops of urine to exude and thus locate the urethra. The external wound should be united by sutures if the conditions will permit, drainage being introduced if necessary.

When a catheter is retained in the bladder it should be kept thoroughly clean by irrigating through and around it with boric-acid solution or other mild antiseptic. The catheter may be removed in from five to ten days, depending upon the extent of the injury. Subsequently steel sounds should be passed every second day, using great gentleness in their introduction, but gradually using larger sizes until the full calibre for the particular patient has been

reached. After the wound has healed firmly the bougies must be continued, at first once a week; later, once a month; and with diminishing frequency for one or two years, to prevent, as far as possible, the formation of a stricture. In all cases this tendency continues throughout life, so that the occasional use of the bougie must be continued.

Five cases of rupture of urethra personally treated by external urethrotomy and suture. Conclusions: 1. In cases of ruptured urethra immediate perineal section with suture of the urethra should be practiced. 2. By this procedure not only is the danger of urinary infiltration and abscess greatly lessened, but in a large proportion of cases one may hope to prevent the formation of close intractable strictures. 3. In an early operation the search for the posterior end of the urethra is much easier than it is later. The hæmorrhage from the branches of the artery of the bulb serves as a guide to that end of the canal. Cabot (Boston Med. and Surg. Jour., July 16, '96).

During the early treatment of these cases, whether an operation has been performed or not, frequent examinations should be made of the region of the wound in order to detect the earliest evidences of infiltration of urine if this should occur. This would indicate that the catheter was not efficiently draining the bladder. Extravasation, accompanied by swelling, pain, and heat, requires early and free incisions, frequent antiseptic irrigations, and dressings.

Gonorrhœa.

A contagious, specific inflammation of the mucous membrane of the urethra or vagina, accompanied by a muco-purulent discharge. The disease may also be communicated to other mucous surfaces. Of these, the conjunctiva is most frequently affected (see CONJUNCTIVA, DISEASES OF), and occasionally the rectum is involved. True gonorrhœa is due to

infection with the gonococcus, first described by Neisser. Inflammation of the urethra (urethritis) may, however, be established by other causes, probably by other micro-organisms under certain conditions. According to the definition given, these cases should not be considered as examples of gonorrhœa, but in practice it is common so to do, as the treatment is almost or quite identical. If any legal questions are apt to arise, it may be necessary to establish positively the nature of the disease.

Gonorrhœa usually results from sexual intercourse with a person suffering from the disease. It may be transmitted in exceedingly rare cases by means of contaminated towels, etc.

Symptoms.—The commonest example of gonorrhœa is that of the urethra in the male, and the remarks that follow will refer exclusively to this form. The disease usually begins to manifest itself within from three to five days after the infecting intercourse. The first symptom is an irritation of the meatus, which is found to be of a deeper-red color than normal, and from which a very slight watery discharge escapes. The urine passing over the affected area usually causes considerable smarting. The inflammation, which began at the meatus, extends backward, and rapidly becomes more intense, so that in twenty-four to forty-eight hours the discharge has become profuse, thick, yellowish, and, in the severer cases, even tinged with blood. The pain experienced in urinating is very intense (*ardor urinæ*). The patient has obstinate erections, especially at night, which are accompanied by severe pain. This symptom, which is called "*chordee*," is rarely absent in some degree of intensity. In many cases the patient is obliged to urinate at very frequent intervals. This is especially true

of the cases in which the inflammation invades the posterior urethra. The swelling of the mucous membrane and periurethral tissues may be so great that the stream of urine is very small.

The severity of each of these symptoms varies widely in different cases, depending largely, no doubt, upon the virulence of the infection. It is a matter of common observation, also, that the first attack of gonorrhœa is usually accompanied with more severe symptoms than subsequent attacks. In fact, a person who has once had gonorrhœa seems predisposed to urethral irritations or inflammation, doubtless induced by infectious or other causes so mild that a perfectly-healthy urethra would remain entirely unaffected. In this so-called subacute or catarrhal type the chief symptom is the discharge, which is more watery than in the acute severe form. There may or may not be slight irritation on passing urine.

Four hundred cases of gonorrhœa examined with a view to the relative frequency of the different complications. Each case examined per rectum. Of the cases, 160 were acute, 180 subacute, and 60 chronic.

Posterior urethra affected in 92.8 per cent. Prostate, vesiculæ seminales, or prerectal vas deferens affected in 141 cases, or 35.25 per cent. (28 per cent. in acute cases, 40 per cent. in the subacute and chronic cases). Of these 141 cases, 88 had prostatitis, 5 vesiculitis, 46 both prostatitis and vesiculitis, and 2 both of these with pelvic vasitis in addition.

All the cases were free from symptoms of complications. Colombini (*Giorn. Ital. Mal. Vener. e Pelle.*, No. v, '96).

Literature of '97-'98-'99.

From a study of urethritis the following conclusions are reached: 1. Of 160 patients attacked with acute urethritis and examined by the author, 26 had anterior urethritis, 22 posterior urethritis, and 112 total urethritis. 2. Vesical tenesmus with frequent micturition was

observed in 6 out of the 26 cases of anterior urethritis. 3. Out of the 22 cases of posterior urethritis vesical tenesmus with frequent micturition was observed 7 times, and in 10 cases there were frequent pollutions. 4. In total urethritis, even when complicated by prostatitis, gonocystitis, or epididymitis, vesical tenesmus was never observed, nor were pollutions or pains in the posterior urethra. In 13 out of the 112 cases of this group there was a little blood at the end of micturition. 5. The terminal hæmaturia would seem to indicate that the internal orifice of the bladder is profoundly affected by the inflammatory process which, in this case, occupies the fold of the vesico-urethral orifice. S. Rona (*Archiv f. Derm. u. Syph.*, p. 141, '98).

The following is a precise means of diagnosing posterior urethritis: The urethra is first washed with a 0.5- or 1-per-cent. boric-acid solution, then a $\frac{1}{4}$ -per-cent. pyoktanin solution is injected and retained for five minutes in the canal, and finally the urethra is again washed with the boric-acid solution until the washings pass colorless. The patient then urinates, and if the urinary filaments passed are found to be colored violet, it is an indication that they come from the anterior part of the urethra. If, on the contrary, they are colorless, they come from the posterior part. E. Lehrwald (*Sem. Méd.*, xviii, p. 18, '98).

Experiments with pure culture of the gonococcus obtained from a gleet discharge of two years' standing gave following results: 1. Attempted reinfection of the original urethra with this culture always failed. 2. The culture, when transplanted to a coccus-free urethra, produced typical acute gonorrhœa. 3. Infection from this back again to the original urethra gave a fresh gonorrhœa, which, after a typical acute course of five or six weeks, again subsided to a chronic gleet. This most interesting experiment demonstrates that by passing an attenuated gonococcus through another individual—that is, through a fresh culture ground—it becomes again virulent to a urethra which was immune to it before. This explains how an apparently healthy

man, if he have the gonococcus lurking anywhere in his urethral tract, may infect his hitherto uninfected wife, and how he may be again infected from her. H. Brooks Wells (N. Y. Polycl., May 15, '98).

The earliest diagnostic symptom of urethral contraction is the appearance of shreds in a clear, or semiclear, urine. At first these shreds are almost imperceptible, but their presence is quite constant from the time of submucous involvement, and as the canal becomes smaller the shreds increase in size. No case of gonorrhœa should be discharged as cured until the morning urine is clear of *débris*, and the patient should be kept under observation for at least six months, that urinal shreds may be detected early should they appear. J. Henry Dowd (Phila. Med. Jour., Mar. 11, '99).

There is also a small class of cases designated "non-specific" because of the absence of the gonococcus. The usual causes assigned are: contact with irritating vaginal secretions other than those of gonorrhœal origin, the introduction into the urethra of irritating liquids or foreign bodies causing inflammation, etc. The symptoms of these cases begin as do those of true gonorrhœa, but usually run a much shorter and milder course.

Literature of '97-'98-'99.

In many cases of chronic urethritis one is unable to demonstrate the presence of the gonococcus; these cases are probably non-infectious. In any case the possibility of infection as compared to an acute urethritis is small. A urethritis due to an attenuated organism, and consequently modified in intensity, may be contracted from a chronic urethritis.

Conversely: Several negative examinations of the secretion from a chronic urethritis do not prove its non-infectiousness. The infectiousness or non-infectiousness of a chronic urethritis can only be determined by frequent and careful examinations of the secretion, and if these prove negative, by the non-appear-

ance of the gonococcus after the application of Neisser's test (an acute urethritis caused by saline nitrate injections). E. R. Owings (Johns Hopkins Hosp. Bull., Oct., '97).

Abortive Treatment. — In theory the abortive treatment of gonorrhœa is ideal. It is successful, however, in the very earliest manifestations of the disease only. In practice, unfortunately, patients are very rarely seen at this stage. After the gonococci have penetrated beneath the superficial layers of the urethral epithelium, and after the symptoms are well marked, this method should not be employed. In adopting this treatment the surgeon should be guided to some extent by the wishes of the patient, as well as by the local condition. There are cases in which it is imperative to cut the disease short. It should be explained to the patient that the abortive treatment will be followed by considerable inflammatory reaction, and that it may fail to arrest the disease.

Given, therefore, a patient who presents himself, within from one to three days after exposure, with a slight irritation at the meatus and a scant, watery discharge, the advantages and disadvantages of the abortive treatment should be fairly presented, and, if he so elects, the surgeon is justified in carrying out this method. The technique is as follows: The patient urinates, the anterior urethra is then washed out with sterile water or boric-acid solution, and a solution of silver nitrate, 20 grains to the ounce of distilled water, is applied to the first inch and a half or so of the urethra, either with a French pointed urethral syringe or a cotton swab introduced through an endoscope. The patient should then be treated as for the early stages of acute gonorrhœa. All the symptoms of acute anterior urethritis develop rapidly, and in successful cases,

gradually subside and disappear in a few days. If unsuccessful the disease runs the usual course.

Instead of this single, powerful application, frequent, copious irrigations of the anterior urethra with potassium permanganate, 1 to 2000; corrosive sublimate, 1 to 5000; or silver nitrate, 1 to 1000, may be employed. By this method the patient is spared the discomforts caused by the more active treatment, but it is less likely to succeed.

Literature of '97-'98-'99.

Janet's method is abortive.

The method of large douches of permanganate of potassium and lime assures absolute cure in nearly every case of gonorrhœa which is treated from the beginning or which has been submitted to rational treatment until the method is established. Complete cure is usually maintained. This method assures a minimum of complications. Folliculitis or prostatitis may be produced by the method, and, if these have already occurred, the treatment has little influence on them. It is not necessary to douche the posterior urethra systematically, but to attack it only when it becomes diseased. It is not necessary to make more than four or five posterior lavages if the second portion of the morning urine does not become clear rapidly under its action. Weak solutions (1 to 8000 or 1 to 5000) appear best to produce the desired result. This method assures rapid cure and is less liable to produce complications than the method which employs stronger solutions. Albert Hogge (*Ann. de la Soc. Medico-Chir. de Liège*, Apr., '97).

In the abortive treatment of gonorrhœa the urethral orifice is to be disinfected, and after micturition a few drops of a solution of nitrate of silver, 1 part to 50, are introduced with Guyon's instrument into the fossa navicularis. This method is used only when gonococci are found; when the deeper parts of the urethra are not yet attacked, when the deeper layers of the mucosa are in a healthy state, and when the cases are

fresh (no treatment having been applied). During the years 1891-96 only 120 cases were found suitable to be treated in this abortive way. Of these 120, 52 were successful. E. Pontoppidan (*Ugeskrift for Læger*, p. 457, '97).

In prostatic and urethral trouble attributed to bicycle-riding, there is nearly always some secondary or underlying cause—either the remains of an old gonorrhœa or a uric-acid diathesis. The healthy urethra seems to suffer little from bicycle-riding, even with an ill-fitting saddle, but the urethra or the prostate, which has lurking in its crypts the relics of an old gonorrhœa, or which is irritated by uric acid, is very likely to be stirred into annoying activity. J. M. Robinson (*Med. News*, Oct. 1, '98).

If either of these has been tried and has failed, the following routine treatment should be carried out:—

Treatment.—In the most severe cases with a high grade of inflammation, profuse discharge, ardor urinæ, and chordee, it is very desirable to have the patient go to bed, or at least to be as quiet as possible. A light diet should be ordered, consisting largely of milk, with bread, potatoes, well-boiled rice, and such plain farinaceous foods. Water should be drunk freely. The bowels should be kept rather free with small doses of some saline laxative, repeated as often as necessary to secure the desired result. The use of alcohol should be forbidden. Sexual excitement is harmful, and coitus is to be positively forbidden, both on account of the contagious nature of the discharge and the injurious effect on the disease. The urethral discharge should be received on a small piece of absorbent cotton held in place by a gonorrhœa apron, or similar device, and the glans and prepuce bathed frequently with soap and warm water for the purpose of cleanliness and also to avoid balanoposthitis. The most rigid caution must be observed in disposing of the

soiled cotton, towels, and all other articles contaminated with the discharge, and the hands should be most carefully washed after each dressing, as gonorrhœal pus, if transferred to the eye in any manner, excites a most violent inflammation which requires the most constant and active treatment for weeks and may even result in the loss of the eye.

Gonorrhœa is a local disease, and must be treated largely locally. Internal remedies are of use, however: (1) to render the urine neutral or faintly alkaline, and hence less irritating; (2) to increase the flow of urine; and (3) to allay irritation of the urinary tract by such drugs as are sedative to mucous membranes and are excreted by the urine. Liquor potassæ meets the first indication. It may be given in doses of 10 minims, freely diluted in water four to six times a day. Potassium citrate fills both the first and second indications. The dose is 20 grains in half a glass of water every two to four hours. With either of these may be combined sweet spirit of nitre if there is fever, and potassium bromide to lessen the excitability of the nervous system. The third indication for internal treatment cannot well be met when the urethritis is very acute, as cubebs, copaiba, and sandal-wood seem to exert a more favorable influence on the sub-acute and chronic cases. When the severity of the inflammatory symptoms has passed off, however, one of these may be administered with advantage. A combination which has been very satisfactory in a large number of cases is the "compound-salol capsule" originated by Dr. White a few years ago. Each capsule contains: salol, 5 grains; oleoresin of cubebs, 5 grains; Para balsam of copaiba, 10 grains; and pepsin, 1 grain. Four to 6 of these are to be given daily after meals. Capsules of either the

cubebs or copaiba or the two in combination may be given and in the more chronic stages the oil of sandal-wood, 10 to 20 minims after each meal, is efficient.

Literature of '97-'98-'99.

Nine cases of acute gonorrhœa in the male have been treated by the internal administration of methylene-blue. All cases were first attacks. Two cases were seen four and five weeks, respectively, after the discharge had ceased, and no recurrence had then taken place. In one of these cases the discharge ceased in twelve days and in the other in sixteen days. The methylene-blue is excreted unchanged in the urine. The dose given was 3 grains three times a day. J. Moore (Brit. Med. Jour., p. 140, '97).

Locally cleanliness secured by frequent bathing and suitable means to receive the discharge are very desirable. Rubber covers and bulky dressings that retain the secretions and macerate the parts are objectionable. If urination is accompanied by severe pain, great relief will be secured by immersing the penis in a vessel of water as hot as can be borne comfortably during the act of passing the water.

Urethral injections or irrigations may be employed from the beginning of the disease. Certain points must be kept in mind in this connection:—

1. Nothing is to be introduced into the urethra until it has been cleansed by passing urine.
2. The solutions used in the early stages must be exceedingly mild unless abortive treatment is attempted.
3. In the beginning the injection is confined to the first inch or two of the urethra. In high grades of inflammation the solutions should be slightly alkaline, and if used as warm as can be borne will give greater relief. It may be stated positively that any application that causes severe or prolonged pain or smarting is harmful, as the re-

sistance of the tissues is thus lessened and further extension of the infection is favored in consequence. In an acute case the injection may be of potassium permanganate, 1-10,000 to 1-5000 in normal salt solution, as in the following formula:—

R Potassii permangan., $\frac{1}{2}$ to 1 grain.
Sodii chloridi, $\frac{1}{2}$ drachm.
Aquæ destillatæ, 11 fluidounces.

M. Sig.: Use four to six times daily, as directed.

A similar solution is also employed to "irrigate" the urethra. To a pint of distilled water may be added from $\frac{3}{4}$ to $1\frac{1}{2}$ grains of potassium permanganate and 45 grains of sodium chloride, the solution warmed, and placed in a fountain-syringe to which a urethral nozzle is attached by rubber tubing. The reservoir should be two feet above the pubes. Urine having first been passed, the solution is allowed to run, and the nozzle fixed firmly in the meatus. As soon as the anterior urethra is distended the nozzle should be removed and the urethra allowed to empty itself. This is repeated until the pint of solution is all used.

Literature of '97-'98-'99.

Solution of 1 in 1000 to 1 in 2000 silver nitrate used, applied by means of a soft catheter once or twice a day. If this causes much irritation, a weaker solution is used at first. In twenty acute cases sixteen were cured in twelve days. Galewski (Wiener med. Woch., No. 23, '97).

In acute gonorrhœa the following is recommended: Plenty of natural spring-waters, which produce the best diuretic and cathartic effects. Permanganate of potassium in hot aqueous solution 4 grains in 1 pint as a urethral injection used three times daily for a week. At the end of this time the following:—

R Bismuth subgallat., 1 drachm.
Zinci sulphatis, 18 grains.
Aquæ calcis, 6 ounces.

M. Sig.: To be used as an injection thrice daily after urination. John L. Howard (N. C. Med. Jour., Mar., '98).

Irrigations with permanganate of potassium are as efficient as those with argonin and protargol, and possess the merit of being extremely cheap. Niebergall (Deut. Milit. Zeits., No. 6, '98).

Protargol, the new silver proteid compound, has been personally given a careful trial in 40 cases of acute gonorrhœa, most of them being seen during the first week of the infection, and none of them having been previously subjected to other treatment. From these cases it is decided that protargol is a very efficient anti-gonorrhœal remedy, which, if employed at an early period, exerts prompt and favorable influence upon the course of the disease, in the majority of cases, arresting all acute manifestations, causing rapid disappearance of the secretion and gonococci, preventing extension of the process to the posterior urethra, and usually giving good results even in fully developed cases of anterior and posterior urethritis. The injection of protargol ($\frac{1}{4}$ of 1 per cent. to 1 per cent.) should be kept up for a number of weeks, after which astringents should be resorted to in order to prevent recurrence. E. Finger (Times and Register, June 11, '98).

To subdue a very high grade of inflammation the following will be found useful:—

R Ext. opii aquosi, 16 grains.
Vel morph. sulph., 2 grains.
Liq. plumbi subacetat. dilut., 6 fluidounces.

M. Sig.: Use warm, if possible, four to six times daily.

The pain experienced upon passing urine is most efficiently treated by rendering the urine slightly alkaline and by diluting it by drinking water very freely. Painful erections or chordee may be so

persistent and painful as to demand treatment.

For the relief of this condition the patient should be instructed to empty the bladder just before retiring for the night, and to be awakened by an alarm clock at the end of three or four hours for the same purpose. He should sleep upon a hard mattress, with but a light covering over him, and he should avoid lying upon the back.

Of the drugs that are useful, the bromides may be given in full doses, and in the more severe cases chloral or opium may be necessary. A suppository containing opium, belladonna, and monobromated camphor may be administered at bed-time when necessary, but should be employed only for severe pain. If a painful erection occurs, the patient should arise and apply cold locally, although in rare instances heat gives greater relief. Cold applications to the spine are also efficient in some cases.

Such is the routine treatment during the first few days in the cases presenting very acute inflammatory symptoms. When these subside, or, from the beginning of the cases of the subacute type, the injections may be made somewhat stronger, like the following:—

R Potass. permang., $\frac{1}{2}$ to 1 grain.

Boric acid, 1 to $1\frac{1}{2}$ drachms.

Aquæ dest., 6 fluidounces.

M. Sig.: Use as an injection four times a day after urination.

An injection like the following is useful in a large proportion of cases at this stage:—

R Hydrarg. chlor. corros., $\frac{1}{12}$ to $\frac{1}{6}$ grain.

Zinci sulphocarb., 24 to 30 grains.

Ac. carbol., 10 to 12 grains.

Boroglyceride, 2 fluidrachms.

Aq., q. s. ad 6 fluidounces. (White.)

This is to be used in the same manner

as the previous prescription. It may be diluted at first if its use causes pain. During this period one of the capsules already alluded to should be given.

As the amount of discharge diminishes, the injections may be made stronger and more astringent. Any of the following may be employed. Sulphate of zinc, acetate of lead, or alum, 1 to 5 grains to the ounce of water; glycerite of tannic acid, 10 to 30 minims to the ounce; and fluid hydrastis, 5 to 10 minims to the ounce, using the milder strength first, and gradually increasing the proportion. Various combinations of these drugs may be made with advantage in many cases. When the discharge becomes very scant and watery the treatment may be less active, the injections being made less frequently, although the strength may be cautiously increased. The average duration of a case of gonorrhœa is about six weeks. In some instances it is much less than this, while in others the period is much longer. The last trace of the disease to disappear is a drop of discharge or an undue moisture, observed at the meatus on rising in the morning. When this has been absent for some time, the cure may be considered complete. Shreds of epithelium may, however, continue to be present in the urine for some time.

Most satisfaction in treating gonorrhœa obtained by use of permanganate of zinc. Permanent cure noted in 50 cases treated by this drug. It is equally successful in both acute and chronic cases. After the stage of acute inflammation has subsided injections are made four or five times a day after urination, with an ordinary blunt-pointed hard-rubber syringe with a capacity of three to four drachms. Beginning with a solution of $\frac{1}{2}$ grain to the ounce of water, one gradually increases to three times that strength. H. S. Hotaling (Med. News., Nov. 7, '96).

The treatment by argentamin can be commenced at any stage of the disease, and usually insures a complete cure within a fortnight, no presence of gonococci in the discharge after this time being discernible. In urethritis daily injections of 1 in 2000 solution should be given. At first, after the injections, a slight increase of discharge is noted, but afterward this gradually and rapidly disappears. In vaginitis the daily local application of 1 in 1000 solution has been found most efficacious; while, in gonorrhœal endometritis, swabbing the uterine cavity with a 5-per-cent. solution is to be recommended. Gordon (*Med. Record*, Nov., '96).

One-and-one-half-per-cent. solution of argonin used, injecting $2\frac{1}{2}$ drachms, to be retained for five minutes. Of 12 cases observed, in 9 the gonococci permanently disappeared in from 2 to 6 days. The secretion persisting after the discontinuance of the drug can be relieved by the use of zinc sulphocarbolate and other remedies. Lewin (*Berl. klin. Woch.*, Feb. 17, '96).

Argonin used in 15 cases of gonorrhœa. The gonococci disappeared from the discharge in 9 days, on the average, without any noticeable symptoms of irritation being caused by the injections. After the germs had disappeared treatment with other astringents was continued for 21 days in order to complete the cure. A. Gattheil (*Deut. med. Woch.*, No. 35, '96).

Literature of '97-'98-'99.

Results of treatment of gonorrhœa with argonin in 158 cases observed, the usual strength of the solution being 3 per cent. The writer infers that: (1) gonococci disappear from the urine in about three weeks under this treatment; (2) solutions varying in strength from 3 to $7\frac{1}{2}$ per cent. cause no irritation; (3) the cure in cases of acute, hæmorrhagic cystitis is prompt. Baltz (*Monat. für prakt. Derm.*; *Centralb. f. Gyn.*, No. 21, '97).

If gonococci are found in a discharge, the use of protargol should be commenced at once, and the injections should be used three times a day. At two of these applications the fluid should be retained for

five minutes, while at the third the time may be prolonged to thirty minutes. After a few days one injection of protargol daily will suffice, while at the other two occasions some astringent may be substituted. As the treatment is painless, it can be continued for three or four weeks if necessary. The strength of the solution should at first be $\frac{1}{4}$ per cent., but it may soon be increased to $\frac{1}{2}$, and ultimately to 1 per cent.; excellent results have been obtained in cases of urethritis in women by solutions of from 5 to 10 per cent. Protargol is the best, the safest, and the quickest remedy employed in the treatment of gonorrhœa. Neisser (*Centralb. f. Derm.*, Oct., '97).

Protargol is better than any other silver preparation, used as a 1-per-cent. solution for the anterior urethra, and $\frac{1}{2}$ to 1 per cent. for the posterior urethra. Goldenberg (*N. Y. Med. Jour.*, Jan. 22, '98).

Largin is a gray powder produced by the action of an ammoniacal solution of oxide of silver on an alcoholic solution of the dry product of decomposition of the paranucleoproteids. In a solution of 1 in 4000 kills the gonococci. Kornfeld (*Wiener med. Presse*, Aug. 14, '98).

The following conclusions have been reached in regard to largin in gonorrhœa: (1) largin as an antigonorrhœic is at least equivalent to the other silver compounds; (2) it surpasses the other silver albumin compounds with regard to the power of killing the gonococci; (3) it penetrates more deeply with dead organic substances. Treatment should begin early to prevent immigration of the gonococci into the deeper parts of the mucous membrane. It may be injected in 1- to $1\frac{1}{2}$ -per-cent. solutions several times a day and retained in the urethra for from ten to thirty minutes. Pezzold (*Wiener klin. Woch.*, No. 11, '98).

The following treatment recommended for chronic gonorrhœal urethritis: A solution containing alum, sulphate of zinc, and carbolic acid— $\frac{1}{2}$ drachm of each to 6 ounces of distilled water—is applied by means of an Ultzmann syringe and soft catheter, first to the posterior urethra beyond the compressor-urethræ muscle, afterward to the anterior urethra in front of the compressor mus-

cle. On the first day the strength of the above solution is $1\frac{1}{2}$ ounce to $7\frac{1}{2}$ ounces of distilled water; on the second day, 6 drachms to $7\frac{1}{2}$ ounces; on the third day, 12 drachms to $7\frac{1}{2}$ ounces; on the fourth day, 12 drachms to $4\frac{1}{2}$ ounces. After this the discharge usually ceases, and nothing remains but a few shreds and turbid urine. Then weak solutions of silver nitrate are applied in the same way, starting with 1 in 12,000, gradually increased in strength to 1 in 6000 on the fourth day. This is followed by passage of a sterilized sound into the bladder and allowed to remain there five minutes, after which 1 in 5000 silver-nitrate solution is again applied. This manœuvre is repeated every four days till the shreds are free from gonococci and pus. In cases where a morning drop of pus persists after the above treatment this is due to follicular involvement, which is treated by the application of 10- to 15-per-cent. silver solution, the follicles involved being found by the endoscope. If several large shreds persist after repeated use of full-sized sounds, there are probably granular spots which must be treated in the same way with silver nitrate. Injections are not recommended in the early stage of profuse discharge. Attention is called to lubrication of catheters and sounds with glycerin in place of oil, the latter preventing the solution used from coming into contact with the mucous membrane. Dowd (*Buffalo Med. Jour.*, Aug., '97).

The prolonged use of hot-water irrigations is advised in both acute and chronic gonorrhœa. A soft catheter is passed to within one inch of the prostatic urethra. It is then connected with a "gravity apparatus," in which the water is gradually heated up to the tolerance-point. The stream flows through the catheter and then back between catheter and mucous membrane, thus flushing out the anterior urethra. Several quarts of warm water are thus passed, some patients having a tolerance-point as high as 180° - 190° F. C. S. Murrell (*Mass. Med. Jour.*, vol. xviii, 289-292, '98).

In brief, the principles of the treatment for posterior urethritis are:—

1. Irrigations with the Janet method

in a recent case of gonorrhœa will in many cases prevent posterior urethritis.

2. Irrigations with the recurrent catheter with permanganate of potassium, followed by injections of protargol, will cure in a relatively short time a case of sub-acute posterior urethritis without complications.

3. When chronic posterior urethritis lasting for a long time has caused infiltration of the submucous tissues, then the application of a sound with ichthyol salve gives the desired results. A. Ravogli (*Internat. Jour. Surg.*, Mar., '99).

A new preparation of argonin is called Argonin-L. The new argonin is easily soluble in cold water and can be kept in solution for several months without decomposing. Also it contains 10 per cent. of silver instead of 4.2 per cent. A 1-per-cent. solution is personally used for cases of both anterior and posterior urethritis. Cases of anterior urethritis were treated by injections thrice daily and retained for five minutes. Posterior urethritis was treated by instillation with Ultzmann's syringe. After disappearance of the gonococci, astringent injections of zinc sulphate were used, but the patients had also three injections weekly of the argonin. Frequent examinations of the urine were made and the absence of gonococci and threads demonstrated. Other patients were treated with the old argonin and results showed the superiority of the new argonin. Jellink (*Wiener med. Woch.*, No. 5, '99).

After the patient appears to be well, his habits should be guarded for a few weeks, as the discharge may recur again from sexual excess, overindulgence in alcohol, etc. In some instances of the disease in the subsiding stage the discharge seems to be kept up by excessive treatment. This should be borne in mind, and guarded against. Cases that persist for two or three months usually exhibit localized areas of infection in some of the urethral follicles or pouches, superficial ulcerations, or even beginning stricture formations, and call for a careful urethral exploration.

Literature of '97-'98-'99.

The question as to what the physician shall say to a gonorrhœal patient who wishes to marry may be summarized as follows:—

If the presence of Neisser's gonococci is demonstrated, the physician's duty is clear. But, if the bacteriological examination is negative, his answer should cover the following points:—

As a negative bacteriological examination is not an absolute proof of the absence of gonococci, it is the patient's first duty to make an earnest and sustained effort to rid himself of the gonorrhœa or chronic inflammation of the urethra by a systematic course of specific treatment. This is not to be neglected even in cases where the examination has for a long time repeatedly failed to detect gonococci.

If a complete cure is found impossible, or if the patient refuses to subject himself to further treatment, the physician should explain the case under its various aspects, and leave the decision with the patient. In no case is the physician to assume the responsibility of the gonorrhœa not becoming infectious.

If the patient decides to marry, the physician should impress upon him the fact that he is still capable of giving the infection, and must, therefore, observe the following rules in sexual intercourse:—

1. Urinate immediately before sexual congress to expel any secretion that may have accumulated in the urethra.
2. Avoid as much as possible having intercourse oftener than once a day.
3. Never perform the act twice in succession, because, if the first seminal discharge contains gonococci, the friction attending the second coitus brings them into closer contact with the urethra and cervix, thereby increasing the danger of infection.

If this rule is disregarded, and the act is performed more than once in twenty-four hours, the vagina should be thoroughly flushed out with a vaginal douche, which should, in general, be employed as often as possible. Kromayer (Münch. med. Woch., No. 24, '98).

A previously cured case of gonorrhœa

gives a certain amount of immunity to a patient. The older the man, the less his liability to gonorrhœa. After the age of thirty a man who has had gonorrhœa may in many cases safely have sexual connection with women who would be certain to communicate it to younger men and to men whose urethras have not been rendered to some degree immune by previous gonorrhœa. I. N. Bloom (Amer. Pract. and News, Sept. 15, '98).

Gonorrhœa in Women.

The gonorrhœal process in women affects, in the order of frequency, the urethra, the cervix uteri, the vulva, and the vagina. While in adult life the vagina is the seat of the disease but rarely, before puberty an infection with gonococci is most apt to cause an inflammation of this canal. This is to be explained by the resistance offered by the vaginal mucosa of the adult to this micro-organism. The diagnosis in any case is established if gonococci can be demonstrated in the discharge. Their absence, especially in the chronic forms of the disease, does not, of necessity, exclude the specific origin of the disease. In cases of true gonorrhœa the patient must be warned against infecting the eyes.

Literature of '97-'98-'99.

In routine examinations of the uterine and vaginal secretions in 246 women with various pelvic troubles, gonococci found in 40 (17 per cent.); in the cervical discharge in three-fourths of the cases. The average age of the women thus affected was twenty-eight. Bourstein (Wratsch, No. 29, '97).

Gonorrhœa after the more acute and evident symptoms have passed off, and its contagious properties have been obliterated, leaves in its train a series of characteristic signs on the organs it has implicated, which are designated "the residual signs of gonorrhœal infection." (a) On the vulva it may be noted in the form of red spots around the openings of the glands of Bartholin, around the para-

urethral ducts, or on the summits of the carunculæ vulvæ. (b) As adenitis glandulæ of Bartholin is described the hard nodular, though painless, condition of these glands are felt when the region of the gland is squeezed between the finger and thumb. (c) As shallow circumscribed ulcers at the mouths of the Bartholinian ducts, the result of rupture of a previous abscess. (d) As the great majority of cysts of the gland of Bartholin. Snger (Ann. de Gynéc., May, '97).

On 310 women who had been married for at least a year without becoming pregnant, 72 had been married ten years or over, the others three years, on an average. Of 50 of these women's husbands, 38 had had gonorrhœa and 34 had infected their wives. According to this ratio, in the whole number of husbands there must have been 235 who had had gonorrhœa, and 210 who had infected their wives: an inference that is supported by the fact that in 198 of the women the same inflammatory lesions were found as in the 34 who were known to have contracted the disease from their husbands. Vedelar (Norsk Mag. f. Lgevid.; Hot Springs Med. Jour., July, '98).

Demonstration of the gonococcus is the only reliable method of diagnosing gonorrhœa in prostitutes. Many cases of undoubted gonorrhœa would escape recognition if clinical evidences alone were relied upon. Several examinations should be made if the gonococcus is not found at first. Neisser (Berl. klin. Woch., No. 10, '98).

The grouping of the diplococci in the pus-cells, their long oval shape when they occur in this situation, and the comparative rapidity with which they are decolorized when treated by Gram's method, are together sufficiently characteristic to enable one to give a definite opinion should the gonococcus be present. No opinion should be given if only isolated diplococci free from the pus-cells are seen, even if they are decolorized by Gram's method. Nor should one be prepared to give an opinion unless a pus-cell colony containing at least four pairs of cocci has been identified. The cocci lie

around the nucleus and sometimes appear to indent it, they very rarely penetrate it. Alexander G. R. Foulerton (Trans. Brit. Inst. of Prev. Med., '97).

In the diagnosis of chronic gonorrhœa in the female the symptoms upon which the most reliance can be placed is chronic urethritis. There are other symptoms of chronic gonorrhœa, which, though not of themselves pathognomonic, may become so if associated with disease of the uterus and adnexa. Among these may be included condylomata, signs of inflammation of the glands of Bartholin, the maculæ gonorrhœica of Snger, tissue-defects and scars in the vulva, vaginitis maculosa and granulosa. As a rule, the joint appearance of endometritis and inflammatory diseases of the adnexa bespeaks gonorrhœa. Dependence cannot be placed upon a microscopical examination of the secretion; while the finding of the gonococci is of positive diagnostic value, failure to do so is not proof against the existence of gonorrhœa. P. Broese and H. Schiller (Berl. klin. Woch., July 18, '98).

Where large numbers of other organisms are present and gonococci are relatively few in number, the methylene-blue cannot be depended upon at all, and Gram's method is not satisfactory. In just such cases, the following, which is Pick-Jacobsohn's stain, if properly used, will show the organism, if present, beautifully differentiated. It is made and used as follows:—

R. Ziehl's carbol-fuchsin, 15 drops.

Concentrated alcoholic solution of methyl-blue, 8 drops.

Distilled water, 20 cubic centimetres.

The specimen is to be stained cold for 10 seconds, washed with water, dried, and mounted. The gonococcus will be stained a deep blue, other bacteria a light blue, cell-nuclei a still lighter blue, and protoplasm pink. R. G. Schnee (Bull. Cleveland Gen. Hosp., Apr., '99).

URETHRA.—In the period of incubation, the changes in the external meatus, and the appearance of the discharge, gonorrhœa of the urethra in women is

identical with that observed in men. There is frequent urination, attended with a scalding sensation, and the discharge may irritate the parts contiguous to the meatus, adding to the suffering. The bladder is apt to become affected, owing to the very short urethra, in which case the frequency of urination and tenesmus may be extreme.

In severe cases much benefit will be obtained by putting the patient at absolute rest. Frequent external bathing of the parts with water as hot as can be borne, to which a little bicarbonate of soda or borax has been added, will help to allay the inflammation and insure cleanliness. Internally, some form of potash—the citrate or bicarbonate or even the liquor potassæ—is indicated to give a faint alkaline reaction to the urine, which should be tested frequently and the dose of the drug regulated according to the effect. Water should be partaken of freely. The urethra should be irrigated by some form of reflux catheter, or by Nélaton catheter of small size, which will permit the fluid to flow back around the instrument. The formulæ given under the treatment of gonorrhœa on p. 633 are to be employed, and the patient should invariably urinate before the irrigation to cleanse the canal of discharge. The strength of the solution should be very weak in the beginning of the treatment, but should be increased as the acuteness of the symptoms subsides.

Literature of '97-'98-'99.

Use of a mixture of 1¼ drachms of glycerin with ¼ drachm of ichthyol recommended in the treatment of gonorrhœal urethritis in women. The pus must first be squeezed out of the urethra, and the vulva and vagina are then cleansed with an antiseptic lotion. The solution of ichthyol and glycerin is ap-

plied to the mucous membrane of the vagina as well as of the urethra, care being taken to stretch the mucous surfaces so as to efface their rugæ. A tampon soaked in the solution may also be left in the vagina. The application should be made daily at first. Marmonnier (*Jour. de Méd. et de Chir.*, Jan. 10, '97).

VULVA.—Gonorrhœa of the vulva may be a primary affection and may exist without the involvement of the other parts, it may transmit the disease to either the urethra or vagina, or it may have been complicated by infection of one of these canals from the beginning. It is rarely met with in adult life, but is seen more frequently in young girls, who become infected either during an attempt at coitus or by mediate contagion.

The symptoms appear in one or two days after infection. The vulva is swelled, red, and hot, and a free discharge issues from between the labia majora. Upon separating these, the labia minora are seen to be much swelled and covered with pus. There may also be superficial erosions. The patient experiences severe burning pain in the parts, and the urine, in passing over the inflamed area, causes very acute suffering.

In the treatment rest and cleanliness are the first essentials. Frequent and thorough bathing of the entire inflamed surface with water, as warm as can be tolerated, comfortably, to which has been added some bicarbonate of soda, or borax, will give great relief. Warm solution of potassium permanganate, 1 to 5 grains to a pint, is also useful. Pieces of absorbent lint or cotton wet with a mixture of 1 or 2 drachms of the aqueous extract of opium to ½ pint of dilute lead-water may then be applied to the inflamed surfaces. The vagina should

be irrigated through a soft-rubber catheter with one of the above lotions. Solution of silver nitrate, 10 to 30 grains to an ounce of distilled water, applied once or twice daily, after the cleansing, has a very beneficial effect on the inflamed mucous membranes. As the condition improves, more astringent lotions may be substituted. Chlorate of potash, alum, and zinc sulphate are all useful. If an abscess of Bartholin's gland develops, it must be opened freely and the cavity packed with gauze.

VAGINA.—Gonorrhœa of the vagina is rare in adults, and when present usually affects young girls. It may exist with a similar affection of the urethra, the vulva, or both. The chief symptom is a profuse purulent discharge. It is to be treated on the lines already laid down. Sometimes, after cleansing, tampons of boroglyceride in combination with mild antiseptics or astringents are very useful. For inspection as well as for local applications the knee-chest position gives a much better exposure than any other, and is to be recommended.

CERVIX.—Gonorrhœa of the cervix uteri is the most serious form of the disease, inasmuch as it may extend upward, involving the uterus, the Fallopian tubes, the ovaries, and may give rise to peritonitis. Nor is the danger over when the acute symptoms have subsided. The disease may remain latent in the cervix for a long time, ready to assume a fresh virulence and to spread to other structures under favorable conditions.

The symptoms are variable and by no means characteristic. The mucous membrane is applied so firmly to the uterus with no loose submucous tissue intervening that it does not respond to gonorrhœal infection in the same manner as does that of the other regions mentioned. There is but a moderate

amount of discharge, thus contrasting strikingly with the other forms mentioned, and might easily escape notice, especially with those who had had a previous leucorrhœa. In the more severe cases there may be a feeling of fullness or weight in the pelvis, which is increased by exercise. Menstruation is apt to be more frequent and more profuse than normal, and may be unusually painful. If the cervix be examined, it will be found to be swelled and of a deeper red than normal, with the os somewhat everted, or pouting. A tenacious secretion of muco-pus will be seen issuing from the os and bathing the adjacent parts. The mucous membrane around the os may have exfoliated, leaving an eroded or ulcerated surface. Such conditions may exist for an indefinite period.

In the treatment of these cases it is usually recommended to cleanse the cervix and os carefully; swab with bichloride-of-mercury solution, 1 to 2000; and then apply silver-nitrate solution, 10 per cent.; zinc-chloride solution, 10 per cent.; copper-sulphate solution, 10 per cent.; or Lugol's solution. A more radical and more efficient treatment is the dilatation and curetting of the cervix after the preliminary cleansing. Such active measures should be undertaken only by those specially equipped by large experience. The danger of a consecutive gonorrhœal metritis, salpingitis, and peritonitis demands that this disease receive the most intelligent treatment. The latter conditions belong rather to the gynæcologist than to the genito-urinary specialist.

Excellent results obtained in 60 cases treated with formalin. The vulva is washed with a 1 to 1000 solution of formalin, and before introducing the speculum the vagina is washed out with a 2 to 3-per-cent. solution. By means of a

tampon of cotton soaked with this mixture, care is taken to bring the drug in direct contact with the diseased surface in every part, particularly in the *cul-de-sacs* and rugosities. It may also be well to swab out the cervical canal of the uterus by the use of a 2 to 1000 solution. Should the mouth of the uterus be ulcerated, before the speculum is withdrawn a tampon of gauze impregnated with 1 to 1000 solution of formalin should be introduced and allowed to remain there for two or three hours.

These applications are not painful and should be repeated daily for several days. De Smet (*Jour. de Méd. de Paris*, Aug. 16, '96).

Literature of '97-'98-'99.

Chronic latent gonorrhœa in the male may set up the same disease in a woman without any acute symptoms either in the vulvar region or higher up in the genital tract. The urinary passages often escape entirely. The vagina itself may escape infection, the endometrium alone being attacked. Pregnancy goes on unimpeded, but in the puerperium slight fever is observed and gonococci are found in the discharge. The best injection in these cases is a 1 in 2000 solution of nitrate of silver. Fritsch (*Centralb. f. Gyn.*, No. 31, '97).

Results of treatment in 140 successful cases reported. Solutions of nitrate of silver from 1-1000 to 1-3000 were poured into the vagina through a cylindrical speculum, the cervical canal being swabbed out with the same. In cases of gonorrhœal endometritis the uterine cavity was irrigated with the same solution. Mihajlovits (*Amer. Jour. Med. Sci.*, Jan., '98).

Protargol found to be the safest and best application in the treatment of gonorrhœa in women, in cases in which the cervical canal, the endometrium, and occasionally the tubes are involved. The author's method is as follows: (1) the vulva and vagina are cleaned and disinfected; (2) the cervix is gently pulled down, and when necessary the internal os enlarged with dilators; (3) the uterus is washed out with sterile tepid water; (4) then with at least 3 1/2 pints of a

1/2-per-cent.-protargol solution; next, if this produces no irritation, with (5) a 1-per-cent. solution; (6) the vagina is dried with sterile cotton-wool, and a 5-per-cent.-protargol bougie passed into the cervical canal, and kept in place with a tampon; (7) after fifteen minutes, when the bougie will have melted, the tampon is removed, the vagina dried with wool, and a 10-per-cent.-protargol-glycerin tampon introduced; (8) after twenty-four hours the same process is repeated, and every day for five to seven days, only the protargol solution is strengthened gradually to 2 1/2 per cent., and the bougies to 10 per cent. The woman should keep in bed for the first week of treatment; (9) although at the end of this time no gonococci can be found, it is necessary to repeat the process every other day during the second week; on the alternate days astringent solutions (2 1/2-per-cent. bismuth subnitrate with glycerin and water) and bougies of boro-phenol-alum 1 per cent. are used, though the tampon is still of protargol glycerin; (10) during the third week astringents alone are employed (a daily injection of the bismuth with one alum bougie and tampons of glycerin of tannin); (11) cure is completed in three weeks, but it is well for the woman to continue the injections herself for a time. Fürst (*Ther. Monats.*, Apr., '98).

Stricture of the Urethra.

The urethra, except during the passage of urine, of semen, or of an instrument, is in a collapsed condition. Under normal conditions it is dilatable to a certain calibre, depending upon the circumference of the flaccid penis. Any condition which interferes with this normal dilatability is called a stricture. The common causes that give rise to symptoms of stricture are: 1. Inflammatory changes such as accompany acute urethritis. This condition is temporary and subsides under appropriate treatment. 2. Muscular spasm, usually of the compressor urethræ, and due to the irritation caused by an acute urethritis or

an erosion of the urethra either alone or existing behind a stricture, or more rarely to reflex irritation from hæmorrhoids, anal fissure, etc. 3. The organization and contraction of lymph following gonorrhœa or other form of injury to the urethra. The latter is called "organic," or "true," stricture. Congenital stricture of the urethra is so rare as to be a curiosity. The diagnosis and treatment are, however, similar to organic stricture.

Symptoms.—The symptoms commonly observed by the patient are: a gleety discharge; some increased frequency of urination; dribbling at the conclusion of the act, which is apt to require a longer time than normal and may require some voluntary effort; the stream may be much smaller in calibre than normal; and may be forked, twisted, or otherwise altered. If one or more of these phenomena be present in a man who has had gonorrhœa, or other serious urethral lesion, stricture may reasonably be looked for. The actual presence of this condition is determined by exploration of the urethra. For this purpose the acorn-headed bougie (*bougie à boule*) should be employed.

It has been found as a result of a large number of observations that the following approximate relationship exists between the circumference of the flaccid penis at the middle of the pendulous portion and the calibre of the urethra:—

CIRCUMFERENCE OF PENIS.	CALIBRE OF URETHRA.
3 inches.	26-28 millimetres.
3 $\frac{1}{4}$ inches.	28-30 millimetres.
3 $\frac{1}{2}$ inches.	30-32 millimetres.
3 $\frac{3}{4}$ inches.	32-34 millimetres.
4 inches.	34-36 millimetres.

(White.)

A suitable lubricant for urethral instruments is liquid vaselin or liquid al-

bolene containing 2 per cent. of carbolic acid, or 25-per-cent. solution of boroglyceride containing the same amount of carbolic acid.

If a *bougie à boule* of appropriate size can be passed into the bladder and withdrawn without being arrested at any point, the calibre of the urethra must be considered normal. If a stricture is present the instrument will be arrested at the contracted area if it is distinctly smaller than the bulb of the bougie, or, if the calibre is very nearly the same as the circumference of the acorn-head, the stricture may not be detected until the instrument is withdrawn, the abrupt shoulder being especially designed to detect contractions, when passing in this direction. It is well to begin the examination of a case with an instrument at least nearly equal to the normal calibre of the urethra as determined by the above table, and if it meets an obstruction beyond which it will not pass to try smaller and smaller sizes until one be found that will enter the bladder. Strictures will be met with so small that nothing larger than a filiform bougie will pass, and occasionally even this cannot be introduced.

In urethral instrumentation, whether for diagnosis or treatment, the greatest gentleness should be used. Force is never justifiable.

Etiology.—Nothing need be added under this head to what has been said of the first two varieties of stricture. Organic stricture is usually the sequel of gonorrhœa. The gonococci tend to penetrate the mucous membrane and to develop in its deeper layers, thus establishing also a periurethritis. Further, the severity of the inflammation at one or more points causes exfoliation of the epithelium, so that there is a tendency for the urine to infiltrate the tissues. To

prevent this nature surrounds the vulnerable point with a deposit of lymph which organizes into firm, unyielding scar-tissue, and gradually contracts, interfering with the dilatability of the urethra. The contraction is very slow; so that months and perhaps years may pass before the patient is aware of any distinct trouble in urination.

The next most frequent cause of stricture is rupture of the urethra. This usually occurs in the membranous portion from alighting astride of some sharp object or from fractures of the pelvic bones. The resulting changes are very similar to those observed in strictures of inflammatory origin. The reparative material thrown out around the rupture is far in excess of the actual needs, and when this organizes it contracts and encroaches upon the urethra.

Treatment.—Strictures are treated by (1) dilatation or (2) cutting [(a) internal urethrotomy; (b) external urethrotomy]. The various other methods described are applicable to so few cases or are to be entirely condemned that they will not be mentioned here. For description of these the reader is referred to special works on this subject. It must be understood that all of the following procedures are to be carried out with the most rigid antiseptic detail.

DILATATION.—The method to be chosen in every case in which it is applicable is dilatation. It is unsuitable in: 1. Impassable strictures. 2. Those below 10 or 12 of the French scale, as it is unsafe to pass bougies below this size. 3. Strictures of the meatus and first inch and a half of the urethra, as experience has demonstrated that these will not yield to dilatation. 4. Strictures of the pendulous urethra, usually. If of recent formation and of large calibre, gradual dilatation should be tried. 5.

Traumatic strictures, as a rule, are not dilatable and require division.

Dilatation may be either continuous or gradual. Continuous dilatation is suitable only in strictures below 10 or 12 French. In order to prepare for gradual dilatation in these cases a whalebone filiform should be introduced, and, if possible, two or more, and retained from twenty-four to forty-eight hours. The effect will be to soften and enlarge the calibre of the stricture. Or, having passed a filiform into the bladder, a Gouley tunneled catheter may be introduced over this as a guide and retained. As soon as either of these methods has secured sufficient enlargement, gradual dilatation should be commenced. This form of treatment will usually be applied to strictures situated in the bulbous or membranous urethra, excepting those of traumatic origin.

Gradual dilatation is advised in all cases of stricture of the deep urethra if a No. 12 French or larger instrument can be passed. It should also be tried in recent soft, large strictures of the pendulous urethra, excepting those of the first inch and a half of the urethra. This method is carried out as follows: Suppose a No. 16 French *bougie à boule* has demonstrated a stricture, a No. 17 or 18 metal urethral bougie should be passed and allowed to remain a few moments, after which a 19 or 20 may be introduced. The next treatment should be three to five days later, depending upon the case, at which time probably an 18, 20, and 22 bougie may be passed, and so on, increasing one or two sizes at each visit, until the normal calibre of the patient shall have been reached. Occasionally a stricture will be so dense and inelastic that the same sizes must be used at two or more successive *séances* before a larger size will pass. In carry-

ing out this procedure the general rule should be to "coax" the stricture rather than to employ force. After the full calibre of the urethra has been obtained a bougie of the proper size should be passed at gradually increasing intervals for two to three years, and, if any tendency to recontract is observed, throughout the patient's life.

Literature of '97-'98-'99.

The less force is used, the more certain are the results in the dilatation of stricture. The general rule should be to pass two soft bougies, differing by one-third of a millimetre, or two to four metallic bougies, differing by one-sixth of a millimetre, at a time; to leave them in but a minute or two, or even to withdraw them at once; to pass them not oftener than upon alternate days, and always to begin with a lower number. Thus, and thus only, will one successfully treat a dilatable stricture—that is to say, the great majority of strictures. If one has in hand a "bad" stricture, one may try "prolonged dilatation," but only with soft bougies that enter easily—with, indeed, a bougie that seems "too small."

Clinical experience shows that it is the dynamical, not the mechanical, use of dilating instruments that will give lastingly good results, without inconvenience and without danger to the patients.

If all the resources of this method are fairly tried without achieving sufficient dilatation, there is but one resource—internal urethrotomy in one form or another. A. A. Warden (*Glasgow Med. Jour.*, Sept., '97).

In all cases of old stricture the treatment must be conducted in carefully-regulated stages, and the urine submitted to frequent examination. In some cases, in which the introduction of any instrument has been attended with very considerable difficulty, a capillary catheter has been successfully used.

The capillary catheter must always be handled with great delicacy and patience. After injecting the urethra with warm oil, the penis is drawn forward with the left hand, and the instrument gently

passed down to the stricture. As soon as its progress is arrested it must be withdrawn two or three inches, rotated between the thumb and finger, and again twisted down upon the obstruction. During the repetition of these manipulations it often slips into the bladder, at the same time its free and easy movement in the urethra, together with the sensations experienced by the patient, clearly indicate to the operator that the stricture has been overcome.

The instrument is generally retained in position for about thirty-six hours. When the operation of dilatation after prolonged rest and many patient efforts proves unsuccessful, and the patient remains exposed to the risk of complications, the operation of external urethrotomy, followed by bladder drainage through the perineum, is recommended as the very best surgical procedure that can be practiced. J. W. Cousins (*Brit. Med. Jour.*, Jan. 8, '98).

In every case of urethral stricture the surgeon should first try gradual dilatation before recommending a cutting operation. The results are quite as permanent and the duration of treatment (from 3 to 12 months) is actually no longer than had urethrotomy been performed. S. T. Howland (*Med. News*, Apr. 9, '98).

A special method of rapid dilatation is recommended in the treatment of certain cases of advanced urethral stricture, especially those complicated by some degree of retention of urine and calling for surgical aid. The instrument employed is constructed on the lines of a Holt dilator, and is provided with a pilot-guide, as well as with a screw-top, in case the former proves useless. It contains a fine test-catheter on which the dilators run, and is fed with a series of 7 rods by which dilatation can be carried from a No. 3 to a No. 12 (English scale). The dilatation is effected under anaesthesia, and must be done deliberately, so as to stretch and not to lacerate the stricture, the operation usually lasting about from 10 to 20 minutes. When the stricture has been fully dilated the instrument is quietly withdrawn, and the

urine that remains is evacuated with a full-sized silver catheter. Reginald Harrison (Lancet, Aug. 6, '98).

Notwithstanding the unfavorable results in a few cases, electrolysis is a valuable method in the treatment of the glandular form of chronic urethritis. From a study of 17 cases, the following conclusions are reached:—

1. In all cases of suspected urethral disease (excluding cases of acute urethritis) a careful urethroscopical examination should precede treatment.

2. As a rule, all forms of chronic urethritis can be cured by regular dilations and urethral injections of a silver-nitrate solution.

3. Electrolysis is indicated only in the glandular form of chronic urethritis.

4. Electrolysis will cure the larger proportion of chronic glandular urethritis.

5. If electrolysis fails, the dilatation treatment is indicated.

6. In some cases of chronic urethritis, dilatation treatment preceding electrolysis will prove beneficial.

7. In those cases in which firm and dense cicatrices have developed in consequence of electrolysis, regular dilations should be proceeded with.

8. During treatment endoscopic? examinations of the urethra should be regularly made, controlling thereby, under the direct guidance of the eye, the progress of the disease, and, according to the conditions found, modifying the treatment. G. T. Mundorf (Med. Record, Aug. 20, '98).

URETHROTOMY.—Gradual dilatation having failed, or being impossible, some form of cutting operation will be necessary.

Internal Urethrotomy.—Strictures of the meatus and first inch and a half of the urethra may be divided either by a convex, blunt-pointed tenotome or by one of the various forms of urethrotomes. Strictures situated from an inch and a half to four or four and a half inches from the meatus may be divided by a urethrotome, the dilating instrument being the best for this purpose. If

the calibre is below 15 French, it may be necessary to employ a urethrotome of the Maisonneuve variety to prepare for the dilating urethrotome. The division should be made in the floor of the urethra. After having cut the stricture a *bougie à boule* of appropriate size should be passed to be sure that the proper calibre has been obtained, and, if not, a second division should be made.

A soft-rubber catheter should be passed and retained for from three days to a week. After its removal, full-sized metal bougies should be passed as directed under gradual dilatation, and continued at less frequent intervals for some years.

Literature of '97-'98-'99.

A urethra which is about to be incised should be made sterile, if this is possible, and the urine of such a patient should always be sterilized at least twenty-four hours before the operation, and should be kept sterile during the time of treatment. The administration of 20 drops of a mixture of 1 drachm of salol and 2 drachms of oil of gaultheria, three or four times a day, will sterilize the urine within twenty-four hours. In addition to this the urethra should be irrigated with permanganate of potash (1 to 3000) for five minutes before the operation, or it should be thoroughly "ballooned" with this antiseptic solution by using the ordinary conical syringe introduced at the meatus, and the canal thoroughly distended with the fluid. This should be repeated three or four times, and a sufficient pressure employed to overcome the resistance of the cut-off muscle, in this way reaching the entire canal.

The vast majority of all strictures of the urethra can be treated practically without pain with cocaine anaesthesia.

The susceptibility of every new patient to this agent should be carefully studied.

When the entire urethra is injected, 1 drachm of a 2-per-cent. solution should first be employed, and the degree of the susceptibility of the patient, as well as

the anæsthetic effect produced, can be ascertained in five or ten minutes. If the anæsthesia is incomplete and the patient shows no susceptibility to the drug, another drachm of the same or a stronger solution may be injected.

Anæsthesia of the membranous portion of the urethra may be obtained by carrying the Keyes-Ultzmann syringe-point down to the cut-off muscle, pushing it slightly within, and injecting 10 to 15 minims of a 4-per-cent. solution. Anæsthesia beyond the cut-off muscle is practically impossible.

In meatotomy a few crystals applied just within the meatus, or 10 minims of a 6-per-cent. solution injected, limiting the application by digital closure of the canal one inch behind the opening, will effect complete anæsthesia in division of the meatus or of an organic stricture here. J. A. Wyeth (New England Med. Monthly, Jan., '97).

The very conditions that make cocainization of the urethra desirable also make it difficult. If, however, the urethra is filled with hydrogen dioxide (1 part to 3 of water), and the canal thoroughly cleansed of pus, mucus, shreds, etc.; then washed out with plain sterilized water, and a 4-per-cent. sterile solution of cocaine injected, it takes a much shorter time for the cocaine to act, and the anæsthesia is much more complete than when the cocaine is injected as usual. E. Walter Brierly (Med. Brief, Feb., '98).

In the treatment of deep urethral strictures by internal urethrotomy, personal method is as follows: The urine is rendered antiseptic by giving 5 grains of salol and 5 grains of boric acid, three or four times daily, beginning several days before the operation, if possible. An anæsthetic having been given, the penis is washed with weak bichloride solution (1 to 2000) and the urethra injected with boric solution followed by iodoform and glycerin, 10 per cent. A filiform bougie is then introduced, and over it a Gouley-tunneled staff. This being withdrawn, a Maisonneuve or Teevan urethrotome is inserted and the stricture cut on the roof of the urethra. A Teevan, which cuts to about a No. 26 French, is used. On its

withdrawal Nos. 26, 28, and 30 sounds are passed. A new English catheter, about No. 26, is introduced and the bladder and urethra are syringed out with a boric-acid or very weak bichloride solution, and the catheter tied in. Sometimes a couple of drachms of iodoform and glycerin are injected, part of which flows away. After the operation the boric acid and salol are continued three times daily, or 3 grains of methylene-blue are given in capsules three times daily. The catheter is allowed to remain in the urethra until the third day, and sounds passed on alternate days thereafter. The patient is allowed to get up on the fifth to the seventh day, and is usually ready to leave the hospital to attend at the dispensary on the ninth. G. Davis (Univ. Med. Mag., Aug., '98).

Conclusions based upon the results obtained in 1500 internal urethrotomies: In cases of chronic urethral discharge, internal urethrotomy should be practiced after all other methods of treatment have failed, and even when the urethra will admit a 26 French or possibly a 30 French, the cutting operation often effects a cure. The operation is followed only in very few cases by any untoward symptoms; occasionally slight dribbling of urine may continue, but never any worse than that caused by the stricture for the relief of which the operation was instituted. Among a few other sequels may be mentioned continuance of urethral discharge, pseudo-impotency, permanent chordee (this last very rare); sometimes hæmorrhage following either immediately or shortly after the operation gives considerable annoyance to the surgeon. Fatal results have been personally had from internal urethrotomy and the large majority of patients are permanently cured. G. Frank Lydston (Med. News, Mar. 4, '99).

External Urethrotomy.—This is usually required at the deep urethra, in which situation it is called external perineal urethrotomy. It is required for strictures of the bulbo-membranous and membranous urethra that cannot be cured by gradual dilatation.

A staff is passed into the bladder, the urethra exposed by an incision in the middle line of the perineum and the stricture divided upon the staff. If the staff will not pass the obstruction the urethra should be opened on the tip of the instrument just anterior to the stricture. By carefully holding the divided edges of the urethra apart a filiform may be passed which will act as a guide in dividing the contracted portion.

Literature of '97-'98-'99.

In the operative treatment of urethral stricture, König includes in the technic of external urethrotomy the excision of all cicatricial tissue. At times as much as 3 or 4 centimetres have been excised. If possible the divided ends of the urethra should be united with fine cat-gut or silk sutures; not in its entire circumference, however, the floor of the urethra being allowed to remain patulous. In König's experience in cases in which it is impossible to approximate the cut urethral surfaces the interspace is eventually filled in by regeneration of tissue analogous to that in the urethra. This has been found to take place despite the fact that the urine is evacuated through the fistula. The precaution is taken, after each urination, to carefully cleanse the parts. At the expiration of three weeks the fistula is usually closed. Reinhardt (Phila. Med. Jour., Oct. 15, '98).

Attention is called to certain points in performing external urethrotomies for strictures which may prevent recurrences and annoying complications. The roof of the urethral canal should always be divided as well as the floor. In order to ascertain whether all of the stricture-tissue has been divided, the index finger, with the palmar surface directed upward, should be passed into the perineal wound and down to healthy urethra, well in front of the stricture, and then backward on the roof of the canal into the bladder. The posterior urethra should be dilated with the index finger, a measure which prevents post-operative tenesmus. Drainage is best attained by a large perineal tube, which is withdrawn in two to four

days to be cleansed and then replaced; it should be removed permanently on the fifth to seventh day. Post-operative dilatation should be begun as early as the second day. J. R. Hayden (Amer. Jour. Med. Sci., Feb., '99).

The after-treatment is the same as that given for perineal section.

PERINEAL SECTION.—Cases of impassable stricture of the deep urethra require perineal section. An instrument should be passed as far as possible, and the urethra opened upon its tip, through a median perineal incision. The strictured portion should then be divided, being careful to keep in the line of the urethra. A good light is essential, and the operation should be undertaken only by those who have had considerable experience in this line of work.

After all of these operations a pure-rubber catheter should be passed through the urethra into the bladder and retained for several days. The perineal wound is to be packed gently with gauze. After the catheter is removed urethral bougies should be passed as directed after internal urethrotomy.

Diseases of the Prostate.

ANOMALIES OF THE PROSTATE.—These are among the rarest examples of defective development; they occur only in conjunction with extensive malformations of the adjacent urinary and genital organs.

Wounds of the Prostate.

Symptoms.—These will depend upon the nature of the injury. Wounds of the prostate complicating injuries to the perineum or rectum will be accompanied by the usual symptoms attending lacerated wounds in general. If the urethra is lacerated also, there will probably be retention of urine or extravasation at the point of injury; or retention may result from swelling of the gland, simply, without injury of the urethra.

Infection of the wound will give rise to a diffuse inflammation, or, what is more serious, to phlebitis of the prostatic plexus, which is very prone to cause septicæmia or pyæmia. The extravasation of urine is apt to involve either the perineum or the prevesical space; in the latter case, if not checked by prompt incision and drainage, the extravasation will involve the areolar tissue of the abdomen, thighs, penis, and scrotum.

Wounds of the prostate caused by the unskillful use of catheters will be followed by hæmorrhage, probably by retention, and in some instances by inflammation of the gland.

The constitutional symptoms will depend upon the nature of the local condition. Profuse hæmorrhage will cause a blanched skin, pallid lips, subnormal temperature, and a rapid, thready pulse. Inflammation will be accompanied by severe local pain, frequently throbbing in character; fever, and acceleration of the pulse. Infection of the wound will have superadded to the symptoms of inflammation a higher and more irregular type of fever, and possibly chills. Infectious phlebitis is very apt to be accompanied by chills and pronounced constitutional symptoms.

Etiology.—Wounds of the prostate are of rare occurrence, by reason of the protected situation of the gland. Lacerated wounds of the perineum or rectum caused by the individual being impaled on some pointed object may also involve the prostate. It may be injured in rare cases of extensive fracture of the pelvic bones. The prostate is wounded in puncturing the bladder with a trocar from the perineum, and it may be in carrying out the same procedure through the rectum; and, when enlarged, it has been wounded by injudicious attempts to pass a metal instru-

ment through the urethra into the bladder. It is always cut in performing perineal cystotomy.

Treatment.—The first requisite is rest. The patient should be confined to bed. Wounds of the perineum involving the prostate require the same treatment as is appropriate for lacerated wounds elsewhere. Foreign bodies should be removed, bleeding vessels ligated, the surfaces cleansed as thoroughly as possible, and drainage provided for. Frequently no ligatures will be required, inasmuch as the use of a tampon of iodoform gauze will serve the double purpose of arresting the bleeding and securing drainage. If the wound of the prostate be extensive, it is advisable to introduce a catheter into the bladder through the urethra and to retain it, inasmuch as the subsequent inflammatory swelling may cause retention and the introduction of the catheter at this time would be both more difficult and more painful. If the urethra or neck of the bladder has been opened by the accident, it is particularly important to employ the retained catheter. If it is impossible to introduce the catheter on account of laceration of the urethra, a perineal section should be made for the purpose of introducing the catheter. It may then be placed through the perineal wound, or, preferably, through the entire urethra. If bleeding has occurred backward into the bladder, copious irrigations of warm, boric-acid solution through the bladder should be employed. If the catheter becomes occluded by clots, they may be dislodged by making suction with the syringe or by injecting a little of the boric-acid solution.

Wounds of the prostate caused by fracture of the pelvis must be treated upon general principles in addition to the measures required for the other com-

plications. If the urethra be lacerated a permanent catheter must be introduced, cutting down, if necessary, upon the point of laceration in order to pass the catheter into the bladder. The treatment of rupture of the bladder will be described under diseases of this viscus. Injuries of the prostate resulting from forced catheterization, if slight, recover spontaneously; if more severe, they require the use of the permanent catheter to provide against retention from swelling; and the use of urinary antiseptics and copious draughts of water, perhaps also the administration of mild sedatives.

Wounds caused in performing perineal cystotomy do not require any special attention.

In the care of wounds of the prostate from external causes frequent irrigations with antiseptic solutions and particular attention to all of the antiseptic details are desirable in order to limit as much as possible the extent of the inflammatory reaction. Careful attention to these details may frequently spare the patient the dangers accompanying septic inflammation of the prostatic plexus of veins. All injuries of the urethra or bladder require the internal administration of urinary antiseptics.

Foreign Bodies in the Prostate.

SYMPTOMS.—Pain and tenderness in the perineum and a frequent or almost constant desire to urinate, the act being accompanied by severe pain, are the prominent symptoms. By rectal examination the gland will be found somewhat swelled, unduly tense, and tender to the touch. Softening or fluctuation would indicate the formation of an abscess.

ETIOLOGY.—Vesical calculi, when of small size, may lodge in the prostatic urethra. Occasionally during the introduction of an old catheter a portion will

break off at the point and remain behind. Cases are also sometimes met with in which foreign bodies in the prostate have been introduced into the urethra, and, having passed beyond reach, have lodged in the prostate.

TREATMENT.—In some instances these bodies may be removed through the urethra by the urethral forceps. This is particularly the case of the small calculi that become impacted here. Bodies that cannot be thus removed should be taken out through a median incision. If supuration should supervene, the abscess should be treated according to the general principles applying to treatment of abscesses elsewhere.

Acute Prostatitis.

This occurs in two forms: the follicular and the parenchymatous. The former is much more frequently met with than the latter.

Symptoms.—These vary greatly in degree, probably owing to the nature and virulence of the infection. In the mildest form of the follicular variety there is a sense of heat and fullness in the perineum, with some increased frequency of urination, which is attended with more or less pain. In the more marked cases the same symptoms exist in a much exaggerated degree; the fullness is replaced by severe pain, urination may be very frequent and painful and accompanied with considerable tenesmus, or there may be complete retention. On account of the sensitiveness of the gland, sitting may give rise to considerable pain, and digital examination of the prostate through the rectum will show that the organ is probably larger than normal and distinctly more tender to pressure.

The parenchymatous form, in which all of the structures of the prostate are involved, is accompanied by more severe

symptoms than the follicular variety. The pain is more marked, and frequently of a throbbing character. The frequent urination and tenesmus are greater, or more probably there will be retention from the extent of the swelling. In the follicular variety there is usually a moderate degree of fever with a corresponding acceleration of the pulse. The parenchymatous form is apt to cause a higher temperature and is accompanied by marked constitutional symptoms, not infrequently with chills.

The usual history is that, following a urethritis, the train of symptoms above mentioned develop more or less suddenly. This should always excite suspicion of a prostatic complication. It is to be distinguished from acute cystitis, in which the frequent and painful urinations are more pronounced, while the complaints connected with the perineum and rectum are proportionately less. Inflammation of Cowper's glands gives rise to symptoms confined solely to the perineum. There will be no symptoms referable to the prostate. In all cases the digital examination of the prostate will be the final test by which to determine whether it be inflamed or not.

Etiology.—In the vast majority of cases inflammation of the prostate is due to infection from a posterior urethritis. A number of other factors are mentioned as giving rise to prostatitis. Traumatism is probably one of the rarest of these. Exposure to conditions which cause internal congestions which are usually described as a "cold" is a more common cause. Occasionally the presence of a calculus in the prostatic urethra or other form of foreign body will excite inflammation. The excessive use of cantharides will in some instances have the same effect, as may also the use of irritating injections or of strong chemicals

in the deep urethra. All of these conditions probably act by establishing a favorable soil for the reception and development of micro-organisms. Evidence is lacking to show that horseback-riding and bicycle-riding are productive of injurious effects if proper saddles be selected.

Acute prostatitis occasionally develops in the course of the infectious fevers, and it has been noted in a number of instances of pyæmia. Almost all of the cases met with, however, are due to infection from the gonococcus either alone or in combination with other micro-organisms.

Treatment.—The first requisite is rest. The patient should be confined to bed. The diet should be liquid and chiefly milk. Water may be given freely. In the more severe cases it is desirable to have the bed so arranged that the patient's hips shall be on a higher level than the shoulders. If the inflammation is of a high grade, considerable relief will be afforded by the application of a number of leeches to the perineum and around the margin of the anus. Sitz-baths at a temperature of 100° to 105° and frequently repeated give relief by drawing the blood to the surface of the body. If there is marked vesical irritation great relief will be afforded by administering a mixture containing boric acid, sodium bromide, and tincture of belladonna. If there is much fever, a diaphoretic mixture containing potassium citrate, sweet spirit of nitre, and aconite will be very useful. If the pain is excessive, a small quantity of morphine may be added to the latter prescription. If this fails to relieve the pains sufficiently, suppositories of morphine or opium may be given in addition. If there is retention, the urine should be drawn at regular intervals

with a soft-rubber catheter. If the inflammation has gone on to suppuration, it is desirable to evacuate the abscess as soon as softening or fluctuation is detected by rectal examination. The abscess should be opened in the middle line of the perineum and the urethra and rectum carefully avoided. In the case of small, circumscribed abscesses their presence will probably not be detected, and they usually evacuate themselves by spontaneous rupture into the urethra.

Chronic Prostatitis.

Symptoms.—The most prominent symptom is the occasional discharge of a clear, viscid fluid: the secretion from the glands of the prostate. It varies in amount from a few drops to half a teaspoonful. Occasionally the discharge is accompanied by spasm of the perineal muscles. It may be observed at intervals throughout the day, but it is especially noted during or after an action of the bowels, especially if the movement be constipated. In addition to this, the patient will have at least some of the following symptoms: Frequency of urination, dull pains in the perineum and loins, a tickling sensation in the urethra, pain at the end of urination, some perineal tenderness which may make sitting uncomfortable, and moderately-increased sensitiveness of the prostate on rectal examination. There is usually some enlargement of the gland. The introduction of a catheter may reveal hypersensitiveness of the prostatic urethra. The urine usually shows some cloudiness, especially the first portion, which is due to shreds of muco-purulent matter and masses of epithelium from the prostatic urethra. Those suffering from chronic prostatitis very constantly exhibit an extreme degree of anxiety and mental depression. The various symptoms are magnified by the patient, who

believes himself the subject of some serious malady. This is particularly true of the discharge, which is erroneously supposed by the laity to be semen.

Diagnosis.—Chronic prostatitis must be differentiated from chronic cystitis, vesical calculus, hypertrophy of the prostate, and seminal vesiculitis. In the first of these the characteristic discharge, the mental depression, and the prostatic tenderness will be absent. If the urine be passed in two portions in the case of prostatitis the cloudiness will be in the first portion only, while the second portion will be clear. In inflammation of the bladder the two portions would be alike. Vesical calculus would be excluded if the characteristic symptoms are not present, and finally by demonstrating its absence by the careful use of the sound. Hypertrophy of the prostate usually begins after the fiftieth year of life, and is much more common after the sixtieth year. The distinction will sometimes be difficult to make, because patients with hypertrophy not infrequently have some degree of chronic inflammation associated. The cardinal symptoms of chronic inflammation,—the discharge of prostatic fluid and the cloudy condition of the first portion of urine as determined by the two-glass test,—together with the mental condition would point to inflammation of the prostate, and their absence would argue against it. Inflammation of the seminal vesicles, when chronic, gives rise to symptoms more closely simulating chronic prostatitis than any of the other conditions mentioned. There is apt to be persistent urethral discharge. Pain may be complained of in the back, over the pubes, or in the bladder, and occasionally the rectum or perineum. Digital examination through the rectum will, however, show an absence of changes in the

prostate, and will probably reveal a distended seminal vesicle. As a means of reaching a conclusion in doubtful cases Posner, of Berlin, has proposed the following method: An ounce or two of urine is passed in one glass and a similar portion in a second glass, a quantity still being retained in the bladder. The prostate is then to be thoroughly expressed by massage either by means of the finger introduced into the rectum or by an instrument devised for the purpose. The patient is then requested to pass the last portion of urine. If chronic prostatitis be present this portion of urine will be found to be cloudy and the microscope will show pus-corpuscles, shreds, epithelium, and probably micro-organisms. Gonococci have been found in many cases. In making this test care must be taken not to confound the fluid from a distended vesicle, if one exist.

Literature of '97-'98-'99.

Prostatorrhœa must be clearly distinguished from chronic prostatitis. The secretion from the prostatic gland is a thin fluid, which is cloudy, sometimes milky white, never sticky, and characterized usually by a seminal odor. Prostatorrhœa is never a catarrhal affection; it is a hypersecretion of the prostate, unattended by inflammation acute or chronic, and should be classed under the head of a neurosis. The secretion may contain amyloid bodies which, upon the addition of a 1-per-cent. solution of ammonia, produce the peculiar crystals known after Boettcher, which are never found in the secretion from any other portion of the genital organs except from the prostate. Sturgis (*Jour. of Cut. and Gen.-Urin. Dis.*, June, '98).

Etiology.—Chronic inflammation of the prostate develops insidiously as such, or it remains as a sequel of an acute inflammation. Among the causes which are responsible for chronic prostatitis are irritating injections; injuries from im-

proper use of urethral instruments; foreign bodies, such as prostatic calculi; and conditions which cause a chronic congestion, like constipation, hæmorrhoids, etc. There is also probably a chronic pyogenic infection in which either the dose of the germs is so small or the virulence so mild that but a mild reactionary inflammation results. Such cases may complicate chronic gonorrhœa and urethral strictures.

Literature of '97-'98-'99.

Although sexual excess, masturbation, gout, etc., may be etiological factors in chronic prostatitis, gonorrhœa is the principal cause. H. R. Wossidlo (*Jour. Amer. Med. Assoc.*, Aug. 27, '98).

Treatment.—Every factor which tends to cause congestion of the prostate should be taken away as far as possible. Therefore a contracted meatus, a stricture of the urethra, constipation, etc., should receive appropriate treatment. Sexual excitement should be avoided. Tonics are frequently indicated on account of the rather depressed condition of the health. The diet and digestion should receive attention as well as the matters of exercise, bathing, etc. Irritating articles of diet—such as Cayenne pepper, mustard, sauces, vinegar, pickles, tomatoes, and other acid vegetables and fruits—are to be avoided. Counter-irritation to the perineum—obtained by the daily application of equal parts of tincture of belladonna and tincture of iodine or by the occasional application of blistering collodion—will be beneficial. The daily use of a jet of cold water on the perineum from a bidet is of value in most cases. The low temperature of the water and the force of the stream both tend to cause reflex contraction of the blood-vessels and relief to the congested organ. In some cases the hot hip-baths

for a few moments each day will be beneficial. In the rebellious cases silver nitrate may be introduced into the prostatic urethra with advantage. The application is made by means of a specially-designed syringe with a long, hard-rubber nozzle. In beginning the treatment, 3 to 5 drops of a 1-per-cent. solution should be introduced. This may be repeated at the end of from three to five days. The strength of the solution may be very gradually increased; but, if this be done too rapidly or if the primary application be unduly strong, it will result in considerable inflammatory reaction and distress to the patient.

Literature of '97-'98-'99.

Nearly 40 cases of prostatitis, some of gonorrhœal origin and all chronic or in the later stages of an acute attack, treated with ichthyol with remarkably good results. From 5 to 10 grains of the ichthyol was made into a suppository with from 30 to 38 grains of cocoa-butter. One such suppository was used in the morning after defecation and another on retiring at night. Hollow suppositories are not to be used. A. Freudenberg (Merek's Arch., Mar., '99).

Feleki and others believe that massage is the ideal and the rational therapy for chronic inflammation of the prostate. It empties the ducts, improves the circulation, and tends to cause absorption of the inflammatory products. For this procedure the patient may lie on the back with the thighs flexed and separated. The massage may be performed either with the finger or with an instrument devised for the purpose. The *séances* may last from three to ten minutes, and may be repeated two or three times weekly. The gland should be rubbed from the periphery toward the urethra, and from right to left and left to right alternately.

Literature of '97-'98-'99.

In the treatment of chronic prostatitis a hip-bath and rectal injection of 1 pint of warm water (95° F.) retained as long as possible are advised twice daily. After the rectum is emptied a suppository containing $\frac{1}{3}$ grain of iodoform is inserted, combined with $\frac{1}{2}$ grain of codeine in case of pain. In established chronic cases massage of the prostate every second or third day, with rectal irrigations of hot and cold water alternately, using about 2 litres of each, is recommended. If chronic gonorrhœal urethritis exists it must be treated. H. R. Wessidlo (Jour. Amer. Med. Assoc., Aug. 27, '98).

Abscess of the Prostate.

SYMPTOMS.—The cases which go on to suppuration will present all the symptoms of acute inflammation in a marked degree. The temperature will be high, the pain severe and of a throbbing character, and chills are apt to occur. The diagnosis will be confirmed if an area of softening or fluctuation can be detected by digital examination.

ETIOLOGY.—Acute inflammation of the prostate may undergo resolution, it may result in chronic inflammation, or, finally, in the formation of an abscess. Abscess will be more apt to occur in the cases in which the treatment has been neglected or the health of the patient particularly depressed. Suppuration may occur early or late in the course of the disease. There may be a single abscess or a number.

Literature of '97-'98-'99.

Abscess of the prostate is of infrequent occurrence. Ballou met with only 3 cases in over 1000 cases of gonorrhœa. Second in 1880 collected 140 cases which terminated in rupture. The seat of rupture was as follows: Urethra, 64; rectum, 43; perineum, 15; ischio-rectal fossa, 8; inguinal region, 3; obturator foramen, 2; umbilicus, peritoneal cavity, prevesical space, sacro-sciatic foramen, and at the

border of the false ribs, 1 each. The result in 114 of the cases was as follows: Recovery, 70; death, 34; recovery, with a urinary fistula into the rectum, 10. L. M. Heidingsfeld (Cincinnati Lancet-Clinic, Nov. 5, '98).

TREATMENT.—As a rule, the abscesses open spontaneously into the urethra, and complete recovery occurs. As soon as distinct fluctuation is detected, however, it is desirable not to wait for this event, but to evacuate the abscess by an incision in the perineum, avoiding both the urethra and the rectum. The cases in which this will be necessary are, however, comparatively few. The wound should be packed with gauze and redressed daily.

Literature of '97-'98-'99.

Prostatic abscess may burst of its own accord into the rectum, perineum, or urethra. But the latter event is usually brought about by efforts to relieve retention. They not infrequently refill and burst only to refill again. Incision and drainage will effect the necessary cure, should they fail to heal naturally. Campbell Williams (Clin. Jour., June 9, '97).

Prostatorrhœa.

This term refers to the periodical discharge from the urethra of a colorless or slightly turbid, whitish, viscid fluid, most frequently observed after a constipated stool, but, in pronounced cases, also at other times.

Literature of '97-'98-'99.

Prostatorrhœa is due to an irritation of the follicles of the prostate, stopping short of inflammation, whereby they become more or less dilated, thus favoring some leakage of the prostatic fluid. It is due to some form of sexual excess, or that form of sexual indulgence known as *coitus reservatus*, where the parts are in a highly-excited and hyperæsthetic condition, and where the normal gratification and relief of the nervous tension supplied by the emission is denied. It is

also sometimes induced by severe and prolonged riding on horseback or on a bicycle. Sturgis (Jour. Cut. and Gen.-Urin. Dis., June, '98).

Prostatorrhœa is perhaps invariably a symptom of chronic prostatitis or of inflammation of the seminal vesicles; the subject has therefore been treated under the former heading.

Hypertrophy of the Prostate.

Symptoms.—There may be a considerable enlargement in the size of the prostate without any subjective symptoms whatever. On the other hand, a very moderate or slight enlargement in other cases may give rise to considerable annoyance. The first symptom which attracts the patient's attention almost without exception is increased frequency of urination. This is especially noticed at night. Patients observe that they are obliged to rise once or twice during the night to pass water. No change is noticed usually at this stage during the day. The nocturnal frequency gradually becomes greater, and finally the diurnal frequency is also increased. If the patient be particularly observing, he will note that the natural force of the stream is lacking; that it tends to fall vertically downward, instead of being directed outward away from the body. There is also apt to be some hesitation of the stream in starting, and the stoppage is frequently incomplete. The subsequent course of the case depends, to some extent, upon whether the urine remains sterile or whether it becomes infected. In the former case, as the overgrowth of the prostate becomes more and more pronounced, there is a corresponding obstruction offered to emptying the bladder. The result is that at the conclusion of each act of urination a certain portion of the urine remains. The normal capacity of the blad-

der is therefore reached much earlier than would be the case if the viscus had been completely emptied. This is the cause of the more frequent passage of urine. When the amount of residual urine reaches several ounces to a pint or more, it naturally requires but a short time for the bladder to become fully distended and to call for relief. In some cases the obstruction is so great that normal urination is impossible; the bladder becomes distended to its utmost limit, when the urine escapes voluntarily from the urethra as fast as it enters the bladder from the kidneys. This dribbling is a most significant symptom, and one which constantly deceives the patient and not infrequently the physician, the argument being that, owing to the frequent or almost constant passage of urine, the bladder must be empty.

If the urine becomes infected, the symptoms become very marked. The frequency of urination may be every two hours, every hour, or even three or four times within an hour. There may or may not be hypogastric pain, depending upon the degree of cystitis present, and the act of urination is apt to be attended with vesical tenesmus. In rare cases in which there is moderate enlargement of the prostate, but in which the symptoms may have been so mild as to escape observation, after the patient has gone an unusually long time without passing water, he may find himself unable to do so, and resort to the catheter will be necessary. This retention may be the first evidence which the patient has had that the prostate is affected.

The amount of pain varies in different cases. In the milder forms of the affection it is usually entirely absent. In more pronounced types of the disease the patient will complain of indefinite pains in the hypogastrium, the groins, or small

of the back, and a sense of fullness in the perineum or rectum. In the later stages more or less severe pain will be present either as a result of a distended bladder or of cystitis. There may be a soreness or smarting of the urethra and shooting pains in the glans, similar to those felt in cases of stone in the bladder. In the cases accompanied with severe cystitis in which there are frequent and violent efforts made to pass water the tenesmus which is present may result in the production of hæmorrhoids or of prolapsus ani. In the later stages of the affection the urine is very apt to contain blood, sometimes in microscopical quantity only, while in other cases the amount of bleeding is very great. As long as the bladder remains uninfected there are no characteristic changes in the condition of the urine. In the presence of infection the usual evidences of cystitis will be observed. The enlarged prostate sometimes causes a marked erethism or even priapism. The presence of residual urine and the ammoniacal decomposition which is apt to result predispose to the formation of phosphatic calculi, and it is a matter of common experience that patients suffering from enlargement of the prostate frequently have a stone in the bladder.

Diagnosis.—The diagnosis of enlargement of the prostate is, as a rule, attended with little or no difficulty.

Among the conditions which may give rise to symptoms more or less similar are stricture of the urethra, prostatitis, cystitis, vesical calculus, and the various tumors which are met with in the bladder. Stricture of the urethra will be eliminated if a full-sized urethral instrument can be passed without meeting an obstruction. Prostatitis, if acute, would be most apt to follow urethritis, and would be accompanied by fever and

much more marked local tenderness than will be observed in the case of senile hypertrophy. The chronic form usually occurs in earlier life, and is accompanied by the characteristic symptoms given under the discussion of chronic prostatitis. Vesical calculi, if present, would be detected by the use of a vesical sound. Vesical tumors are rare; they would be suspected after excluding stone and enlarged prostate. The cystoscope may assist in arriving at a positive conclusion. The final test for enlargement of the prostate is digital examination, through the rectum, by which means we are able to detect the presence or absence of any increase in size. The patient should also be examined invariably for residual urine, by passing a catheter immediately after he has emptied his bladder as completely as possible. The length of the urethra is increased in hypertrophy of the prostate in some cases to the extent of one and one-half to two inches, which fact should be borne in mind in passing the catheter. In some cases the use of the cystoscope may be of material assistance in reaching a diagnosis.

Literature of '97-'98-'99.

In examining patients for enlargement of the prostate it is essential to keep to a routine position, such as bending over a chair with the body at right angles to the legs, because the form, position, and consistency of the gland alters greatly with the position of the patient. In tuberculosis deposits should be detected in the testicle, epididymis, prostate, or bladder, in about 80 per cent. of the cases. These tuberculous deposits are noted in three clinical conditions: In young males who notice a lump in one epididymis or the other, in young males who complain of symptoms of vesical stone, or in adults who complain of symptoms of vesical stone.

It is possible for prostatic deposits to become absorbed, but this absorbing

often changes materially the size and shape of the organ. When the deposits do become absorbed in one part, almost always there is invasion of another portion, possibly beyond the reach of the examining finger. E. Hurry Fenwick (*Brit. Med. Jour.*, Feb. 18, '99).

Etiology and Pathology.—After a large number of post-mortem dissections Sir Henry Thompson claimed that 1 man in every 3 over fifty-four years of age showed some enlargement of the prostate. In about 1 case in 7 the enlargement was sufficient to cause some degree of obstruction, and in 1 case in 15 the degree of enlargement was sufficient to demand some form of treatment. The enlargement of the prostate is so common at and after the sixtieth year of life that some writers have described it as physiological. This view does not seem justified, however, inasmuch as in perhaps two-thirds of the population there is no increase in size whatever.

Much has been written upon the etiology of this affection, but without adding anything to our knowledge of the subject. It seems to occur with about equal frequency in the various classes of society; nor do the habits of the individual, so far as can be learned by inquiring, seem to bear any relation to the condition.

The general term hypertrophy or enlargement is applied to the different conditions of the prostate occurring after the fiftieth year of life which result in an increase in its size. It is not intended, of course, in this statement to include the inflammatory affections of the prostate. In some cases the increase in size appears to include all of the structures of the gland in about an equal degree: a true hypertrophy. In other cases there is a circumscribed overgrowth involving only one portion or one lobe, which, strictly speaking, should be termed

hyperplasia. Besides these two forms, true tumor formations are occasionally met with.

The normal prostate consists chiefly of two lateral lobes with a small intermediate portion sometimes called the middle lobe. These may all be equally enlarged or the overgrowth may involve but one or two of the three portions. If the overgrowth is composed chiefly of the glandular elements of the prostate the tumor is, comparatively speaking, a soft one. While if it be composed chiefly of the fibrous and muscular stroma it will be very hard to the touch.

Literature of '97-'98-'99.

From microscopical examinations of 86 cases of prostatic hypertrophy the following conclusions are reached: That the essential alterations in senile hypertrophy consist in increase of the fibromuscular stroma, the latter usually being unimportant and secondary. In a few cases alterations in the stroma prevail, and may induce complete disappearance of the glandular elements. The hypertrophied prostate presents in most cases the characteristics of a large adenoma. In some cases a latent transformation into a malignant epithelial new growth occurs, which finally causes all the symptoms of carcinoma. Albarran and N. Hallé (*Ann. des Mal. des Org. Gén.-urin.*, viii, '98).

Treatment.—As we do not know any prophylactic treatment for hypertrophy of the prostate, and inasmuch as the symptoms of which the patient complains are not those referable to the prostate, but to the function of urination, no particular treatment is to be advised until the abnormal conditions are sufficiently marked to cause some annoyance. In the earlier stages, with slightly-increased frequency of urination only, the patient's comfort may be very much increased by careful attention to hygiene.

As the prostate, the seat of hypertrophy, is in a condition of chronic congestion, everything which tends to increase this should be avoided. The body should be well protected by proper clothing in order to avoid catching cold. The food should be plain, easily digested, and non-stimulating; a diet consisting largely of milk is to be recommended. The function of the bowels should also be attended to. Regular, moderate exercise is desirable rather than the reverse. If the amount of residual urine present be three or four ounces, a soft catheter should be passed once daily, preferably at bed-time so as to give a longer period of rest at night. If the quantity be five or six ounces, it should be withdrawn morning and evening, and, if half a pint or more, it is desirable to pass the catheter every eight hours. After withdrawing the urine it is desirable to irrigate the bladder with warm, boric-acid solution, 10 or 15 grains to the ounce. If there be pronounced cystitis present it may be necessary to pass a catheter more frequently, and the irrigations of the bladder then become especially important. No drugs have any direct influence upon the prostatic overgrowth unless it be ergot, and opinion as to the value of this remedy is divided. If it be decided to employ it, half a teaspoonful may be administered three times a day for a considerable period. Strychnine and other tonics will frequently be indicated for the general conditions.

In catheterizing patients who have enlarged prostates more or less difficulty is frequently experienced as the instrument reaches the prostatic urethra. For this reason it will be necessary in some instances to try different forms of catheters. The elbowed catheter is one of the most useful in difficult cases, and the metal prostatic catheter, which has a

longer shaft and a larger curve, will sometimes pass easily when all other forms are arrested. It should be an invariable rule to use thorough asepsis in all of the urethral instrumentation, in order not to induce cystitis.

Literature of '97-'98-'99.

Seven cases of prostatic hypertrophy with retention treated with a preparation of the prostatic gland. The dried and powdered gland was given in pill form—from 3 to 12 grains daily—or a glycerin extract in doses of from 2½ to 7 drachms daily. Of the 7 cases 5 were cured, 1 was greatly improved, and in 1 there was no result. *Oraison* (*Gaz. degli Osped.*, May 19, '98).

When catheterizing in hypertrophy of the prostate gland, the soft catheter with solid tip is the best to use if possible. If a rigid one be required, one made of elastic webbing, with a curve or bend at the point, is preferable. A new catheter must be treated with the same care as to cleanliness and asepsis as one that has been in use. If possible, it should be exposed to the vapor of formaldehyde; if not, it should be immersed in a solution of formalin (1 to 2 per cent.) during at least fifteen minutes. Then it should be placed in a strip of bichloride gauze, or placed between the folds of a perfectly clean towel. Each catheter should be kept in a separate receptacle or closed drawer, where dust cannot find access to it, and where it cannot be handled except by the person who is to use it. If the patient must carry the instrument about with him, it should be kept wrapped in several layers of bichloride gauze, and outside this should be placed a wrapping of "waxed" or parchment paper, held firmly by rubber bands. Just before using the catheter the patient must thoroughly clean his hands, and rinse his fingers in pure alcohol. In the meantime the catheter should be lying in formalin solution. Then, after shaking it, and wiping off any drops that may remain upon it with a piece of clean gauze, and smearing it with a proper lubricant, the patient should gently pass it along the

urethra. Immediately after use the catheter should be thoroughly washed with soap and water, be steeped for a time in the solution of formalin, and then carefully put away in gauze or clean towel. *Bangs* (*Med. News*, Feb. 12, '98).

The faradic current is more healthfully stimulating to the prostate than the mechanical method of massage. In acute cases it lessens hypertrophy, and cures the weakness of the compressor muscles. *Moritz Popper* (*Wien. med. Blatt.*, Jan. 26, '99).

Operative Treatment.—Of the operative procedures which have been recommended for enlarged prostate, those which seem to-day to deserve mention are: (1) vasectomy; (2) castration; (3) Bottini's operation; (4) cystotomy, for drainage, either perineal or suprapubic; (5) prostatectomy.

VASECTOMY, which grew out of the operation of castration, recommended by *White* in 1893, is distinctly the mildest of the various operative procedures employed in the treatment of hypertrophy of the prostate. In spite of the apparent insignificance of this operation, it has been followed by a small mortality. This is to be explained by the condition of the patients at the time of operation. They are all persons in advanced years who have suffered from chronic obstruction for some time, and who, in consequence, are apt to have cystitis, dilated ureters, and surgical kidneys. Even the introduction of a catheter in some of these cases is followed by fatal consequences. Statistics show that relief, more or less pronounced, follows vasectomy in about 60 per cent. of the cases, in some of which the conditions seem to return approximately to the normal. This operation is to be recommended after the various methods of palliative treatment have failed to give relief. Such patients usually have a moderate degree of enlargement, several ounces of

residual urine, and the difficulty or pain caused by passing a catheter is so great as to demand some other form of treatment. If in addition to these the patient is old and feeble, and if it seems probable that he would not stand a more severe operation, vasectomy should be performed. If this fails to give relief one of the other operations may be performed later.

Of 34 cases of prostatic hypertrophy where the vasa deferentia were excised; 4 died of other diseases; in 2 cases the results were negative; the remaining 28 were either cured or improved. When good results do not follow this operation it is because complete obliteration of the vas deferens has not been obtained. Therefore, in addition to excision, the ends of the canal should be twisted, so as to insure complete closure. Pavone (Il Policl., No. 15, '96).

Resection of the vasa deferentia is particularly indicated in the middle period of prostatism when the patient's troubles—cystitis, hæmaturia, and complete or incomplete retention—are usually the result of congestion. In a later stage, in which the enlargement and deformity of the prostate are due to well-developed structural changes, resection of the vasa deferentia, though it may render service by relieving pain, will necessarily fail to do much good. Nové-Toperand (Lyon Méd., Oct., '96).

In 10 cases of hypertrophy of the prostate in which the following method of operation was used, a satisfactory result was noted at the end of two months. Only 2 of the patients were put under chloroform. The vas deferens is pinched up with the left hand and the skin incised for an inch; with a blunt instrument the canal is isolated, drawn out the length of six or eight inches, torn off the epididymis, and excised. The wound, treated antiseptically, is closed and covered with collodion. A suspensory bandage is applied, and the patient returns to his occupation. Although resection of the vas deferens does not equal double castration in efficacy, it frequently succeeds in improving sufficiently the condition of the

patient. Helferich (Med. Press and Circ., Feb. 26, '96).

Literature of '97-'98-'99.

Vasectomy is of no service in cases of prostatic enlargement characterized rather by intravesical projection than by general increase in bulk. When this condition is present and the obstruction is due to a small nodule, the Bottini operation is especially applicable. Nicolich (La France Méd., Dec. 23, '98).

CASTRATION is indicated in cases in which the bladder symptoms are such as to demand a more prompt result than is apt to follow vasectomy. If the patient be between the ages of sixty-five and eighty years, with marked obstruction and cystitis, and if the vitality be fair, castration offers a better prospect of relief with a smaller mortality than the other operations mentioned. Of course, it is necessary to fully explain to the patient in advance the nature of the operation and to secure his consent. An analysis of the cases subjected to castration shows that in rather more than 80 per cent. of the cases there was marked improvement. The figures are as follow: Rapid atrophy of the prostate, 87 per cent.; disappearance of long-standing cystitis, 52 per cent.; return of vesical contractility, 66 per cent.; amelioration of the most troublesome symptoms, 83 per cent.; and a return of local conditions not very far removed from normal, 46 per cent. (For a full discussion of this subject see article by J. William White in the *Annals of Surgery*, Aug., '95.) In 93 cases of which accurate notes were kept the prostate underwent atrophy in 83 per cent. (P. Bruns). Of 99 carefully analyzed cases there were 9.8 per cent. of failures; 6.6 per cent. was followed by moderate improvement, and substantial or very great improvement was noted in 83.6 per cent. (Cabot).

The mortality from this operation has been 7 per cent., omitting the cases that died from causes having no connection with the operation. It would be much lower had not many cases already *in extremis* been castrated. It will be less in the future, as we learn better how to select cases for this and for the other procedures recommended for prostatic hypertrophy.

Literature of '97-'98-'99.

No further indication for a double castration is found than the presence of incurable disease or pathological change and neuralgias, and in these cases resection of the vas will often result in a cure. In all cases of vasectomy as much of the connective tissue surrounding the cord as possible should be included. Lennander (Cent. f. Chir., No. 22, '97).

Castration diminishes hypertrophy of the prostate, especially when the enlargement is of the glandular form. This atrophy may not begin for six months or even more after operation, and may progress for more than two years. However, in certain cases, it is probable that there may be no atrophy. Out of 124 cases operated upon by castration the mortality was 14.5 per cent., due, in the main, to antecedent infection of the kidneys. Contrasting this mortality with that of the prostatitics received in the Hospital Necker and not submitted to operation, the figures stand at 14 per cent.: *i.e.*, 31 deaths in 220 cases. This operation should be rejected in cases of renal infection, in cases where the patient is extremely ill, and in cases which can be cured by simpler means. Albarran and Motz (Ann. des Mal. des Org. Gén.-urin., Jan., '98).

BOTTINI'S OPERATION.—This method of treatment has recently been revived, and with the improved instrument is doubtless destined to meet the requirements in certain cases better than any other. It would seem particularly suited to the cases in which there is a distinct bar at the neck of the bladder. The

operation is carried out by means of a prostatotome which is constructed somewhat on the principle of a lithotrite. What would correspond to the male blade, however, has at the extremity a platinum-wire loop which is heated by means of an electric current. After the instrument has been introduced the blades are turned in the direction in which it is desired to make the section of the prostate, the current gently turned on, and the wire loop made to cut through the obstructing mass by means of a screw which is attached to the handle. A second and a third section may be made if it is thought necessary. Before beginning the operation the bladder should be partially filled with boric-acid solution, and during the time the instrument is being used a current of cold water is kept constantly passing through it in order to prevent it from becoming overheated. The recent reports upon this operation are of an encouraging character, but a still wider experience is necessary before it will be safe to express a final opinion as to its merits. That it, in common with the other operations mentioned, has a distinct mortality there is no doubt. The necessity for conducting the operation entirely in the dark and without any possibility of a safe guide is a theoretical objection that cannot be entirely overlooked.

CYSTOTOMY, either perineal or suprapubic, may be carried out either with the view of temporary drainage or of establishing a permanent new channel for the escape of the urine. In the former case the physiological rest which the operation affords results in sufficient relief of prostatic congestion to permit the urine to flow through the normal channel. If the urethral flow cannot be re-established, a tube may be inserted into the

bladder for permanent drainage. Several forms of these tubes have been devised. The operation is only to be recommended in cases in which the urethra is absolutely obstructed and the patient rejects vasectomy and castration. The annoyance of wearing the permanent tube, the irritation of the surrounding skin, and the continual soiling of the clothing render the patient's life anything but happy.

Literature of '97-'98-'99.

Suprapubic cystostomy for prostatic enlargement is recommended: 1. In those cases of enlarged prostate in which there is a mechanical and more or less insurmountable difficulty in urinating, and in which catheter-life is impossible, from whatever cause. 2. In cases in which septic infection is the prominent feature, and is the source of danger to the patient, where cystitis persists in spite of skillful catheterization and irrigation of the bladder. The mortality depends, not upon the operation *per se*, but upon the conditions for which it is performed. The state of the kidneys bears about the same relation to the mortality in operations on the bladder as the state of the intestine in operations for strangulated hernia. Poncet (Lyon Méd., No. 32, Aug. 7, '98).

PROSTATECTOMY must always be regarded as a formidable operation. There are rare cases in which a pedunculated growth of the middle lobe or a more or less circumscribed enlargement of one portion of the prostate may be easily and safely removed through a suprapubic opening. The removal of the entire gland either suprapubically or by the combined suprapubic and perineal methods is often a slow and tedious procedure and one which is usually attended with severe hæmorrhage. The class of cases in which this operation may be recommended includes those who are still comparatively young and active, whose pros-

tates are of the harder variety, and in whom castration is not to be recommended for sentimental reasons, or because of the age of the patient.

Literature of '97-'98-'99.

In operating for the radical treatment of prostatic hypertrophy the patient is placed flat on his back; the bladder is carefully washed out, and then left moderately distended, to the extent of from eight to twelve ounces. Then the bladder is opened suprapubically. The forefinger of the left hand is now introduced into the bladder, the location and extent of the prostatic obstruction are determined, and the vesical opening of the urethra is located. In the right hand is grasped a pair of serrated-edged scissors with a long handle. These scissors are slipped along the left forefinger to the urethral opening, and are made to cut through the bladder-wall in that region. The cut extends from the lower margin of the internal vesical opening of the urethra backward for an inch to an inch and one-half.

Then one of the forefingers is slipped through the vesical hole made by the serrated scissors, while at the same time the fist of the other hand makes firm counter-pressure against the perineum. By means of this counter-pressure the prostatic growth is brought well into the reach of the forefinger, which is employed all this time in enucleating the prostatic obstruction, *en masse* or piece by piece. Enucleation should not be desisted from until all the lateral and median hypertrophies, as well as all hypertrophies along the line of the prostatic urethra, have been removed.

A perineal section is then made, and a large-sized (No. 26 American) soft-rubber tube is passed through the perineal cut, and the cut through which the prostate was enucleated, into the bladder. After this, hot-water irrigation is employed for some minutes, to wash out blood-clots and to stop oozing. Then the suprapubic wound is closed by a deep layer of catgut sutures, which include the bladder-wall, and by a more superficial layer of silk-worm-gut (Florentine) sutures. About

in the middle of the cut the catgut suture is omitted and a deep Florentine-gut suture is taken, which includes the vesical wall and the whole extent of the lateral abdominal wall. This suture is not tied at the time of operation, thus allowing a rubber suprapubic drainage-tube to remain temporarily in position. At the end of four or five days this suprapubic drain may in most instances be removed; then this ligature can be tied. It is best not to remove these Florentine sutures till after the patient is up and about. One should avoid operating on individuals in whom the large surface arteries are felt to be atheromatous except for the relief of suffering, since the chance is against their recovery. Fuller (*Med. Record*, Nov. 19, '98).

In obstructive prostatic enlargement, perineal prostatectomy, combined with suprapubic cystotomy with perineal drainage, as devised by Alexander, is the best method so far practiced. The perineal wound is dressed, as is usual, after perineal section. The after-treatment consists in daily washing the bladder, the fluid being injected into the suprapubic tube. The suprapubic tube is removed on the fourth day and the lower tube three days later, after which the bladder is washed by a catheter passed through the perineum. A full-sized sound is passed at the end of the second week, and every five days until the perineal opening closes. Both wounds have usually healed in the course of five weeks. If prostatectomy be resorted to earlier in the disease, while the patient's general condition is still good and while the bladder is not yet infected, and the ureters and the kidneys are still in a healthy condition, the mortality from the operation will be very considerably diminished; and a prostate thus successfully operated upon may be practically relieved or entirely cured of this most baneful disease. Parker Syme (*Annals of Surg.*, Mar., '99).

Tuberculosis of the Prostate.

Symptoms.—Perhaps one-third of the cases are either entirely free from symptoms or have so little inconvenience that the disease is unsuspected. In the

milder forms of the affection there is slight irritation of the bladder, as evidenced by some frequency of urination, which may be attended with burning pain. There is a feeling of fullness or weight in the perineum, there may be a muco-purulent discharge from the urethra, and a similar sediment in the urine. Hæmaturia is also frequently observed. The disease usually occurs in anæmic persons who have tubercular foci elsewhere. It is met with chiefly between the twentieth and forty-fifth year.

Diagnosis.—A number of writers have referred to the similarity between the symptoms of prostatic tuberculosis and of vesical calculi. A consideration of the symptoms and careful exploration by the sound will serve to make the distinction. The presence of tubercular deposits in other portions of the body will always be an element to excite the suspicion of the physician and the finding of tubercle bacilli in the urine would be conclusive. Guyon states that the most careful examination fails to detect the bacilli in 50 per cent. of the cases. Digital examination per rectum might show some local enlargement.

Etiology.—This disease is believed to be invariably secondary to deposits elsewhere in the genito-urinary tract. The disease is usually manifested by circumscribed collections of cheesy material or by abscesses.

Treatment.—The disease can be, to some extent, guarded against if those who have a tubercular tendency avoid all influences that would tend to cause congestion or inflammation of the prostate. The treatment is chiefly constitutional unless the local trouble demands operative interference. It is proper to delay the latter as long as possible on account of the part not being very accessible and also because it is apt to be a part of a

general process. Hill and others have injected iodoform and other substances into the bladder frequently with beneficial results. Hill's formula is as follows:—

R Iodoform, 2 parts.
Mucilage of gum arabic, 4 parts.
Glycerin, 2 parts.
Water, 20 parts.

After washing out the bladder a drachm of this mixture is introduced. This may be repeated every second or third day, depending upon how well it is borne.

Literature of '97-'98-'99.

In the treatment of tuberculous cases of the prostate the bladder should never be washed out, as the case progresses much more rapidly if this is done. E. Hurry Fenwick (*Brit. Med. Jour.*, Feb. 18, '99).

The question of operation will frequently come up in cases of tubercular deposits in the prostate. In a general way it may be stated that, if the general health of the individual is good and if the tubercular process does not yield to any form of palliative treatment, an operation is indicated. The gland may be approached from the perineum and any diseased area thoroughly curetted, or it may be exposed by suprapubic cystotomy. If, however, the patient has deposits elsewhere in the body sufficiently pronounced to give rise to physical signs and if the general health be poor, operative treatment is not to be recommended.

Tumors of the Prostate.

Cysts of the prostate have been recorded, but they are of such rare occurrence that they are to be considered surgical curiosities. The forms that have been described are hydrops of the seminal vesicles, dermoids, and echinococci

cysts. These almost invariably cause retention of urine after they have reached a sufficient size to occlude the urethra by pressure. Upon examination by the rectum a fluctuating swelling may be detected. They are treated either by aspiration of the fluid, or by incision and drainage.

CARCINOMA.—Carcinoma of the prostate is also a rare affection. It occurs in two forms: a slowly-growing, circumscribed tumor, limited to the gland itself, and a diffuse infiltration of the prostate and base of the bladder which develops rather rapidly.

The symptoms of carcinoma of the prostate are those of obstruction from hypertrophy, except that they run a more rapid course. Carcinoma gives rise to more pain, however, than does senile enlargement, and as soon as ulceration occurs there is hæmaturia. Carcinoma of the prostate is exceedingly hard to the touch, and the inguinal mesenteric and retroperitoneal glands are occasionally affected. The most prominent features are the hardness of the prostate, the severity of the pain and its wide distribution, and the rapid course, with the development of cachexia. The cystoscope may be of assistance in reaching a conclusion.

Treatment.—The treatment of carcinoma of the prostate is chiefly palliative. The different indications are to be met as they arise. Excessive pain must be met by morphine internally or by suppository. Operations for the removal of a prostate in malignant disease have either proved fatal at the time from the operation or have had an early recurrence.

SARCOMA.—Sarcoma of the prostate usually occurs in early life. The common symptoms are dysuria, retention, hypogastric and perineal pain, and the

presence of a tumor. Blood is usually present in the urine. This disease runs a more rapid course than any other affection of the prostate.

Treatment.—The treatment in this condition must also be symptomatic and palliative. An operation would be proper only in the most exceptional case. It is needless to say that the prognosis is absolutely unfavorable.

Prostatic Calculi.—These are of two kinds: those formed in the kidney or bladder and lodging in the prostatic sinus and those which form in the gland itself. They vary in size from a pin's head to a nut. They may be either single or multiple.

The symptoms are those of inflammation of the neck of the bladder; occasionally the passage of urine is interfered with.

The diagnosis is usually made by passing a metal instrument, which imparts a grating sensation to the hand as it passes over the calculus.

Literature of '97-'98-'99.

Prostatic calculi may give rise to a mucoid or muco-purulent discharge. The stones may vary in number from one or two up to twenty-five or thirty or even more. They are most usually composed of phosphate of lime, but sometimes consist of carbonate of lime. They are of gray color, smooth, hard, roughly triangular in appearance, and perchance faceted.

Their presence in the prostate causes fullness, bearing-down pain, frequency of micturition, and discharge. They may set up retention of urine through causing swelling or from their size by impaction. Sometimes they can be felt by the finger per rectum. The introduction of a steel sound, if they are not imbedded in the substance of the prostate, will reveal their presence. They may be felt just as the beak of the instrument is passing into the bladder; or when the sound is in the bladder, if one presses the peri-

neum on to the instrument, they will be felt to grate against it. Campbell Williams (Clin. Jour., June 9, '97).

Treatment.—A small calculus in the urethra may sometimes be removed by means of appropriate forceps; when this is impossible a median perineal urethrotomy will be necessary.

Literature of '97-'98-'99.

Unless the prostate should be honey-combed by the calculi, they may be removed by incising the gland in the middle line and scooping them out. The urethroscope best known and most generally in vogue is designed and manufactured by Leiter, of Vienna. C. Williams (Clin. Jour., June 9, '97).

Polyps of the Prostatic Urethra.

Polyps of the prostatic urethra are very rarely met with. The most constant symptom is hæmorrhage from the urethra. There may or may not be difficulty in urination and in catheterization. The treatment is operative. The growth is removed through a median perineal incision.

Urethral, Urinary, or Catheter Fever.

It not infrequently happens that a patient will have a chilly sensation or a very slight chill after an instrument has been passed into the bladder, especially at the time of the next urination. This is not followed by the hot stage or the sweat, and there is no elevation of temperature. The phenomenon is supposed to be of reflex origin, and does not constitute urethral fever. It is of no significance and requires no treatment.

In rare instances after instrumentation of the urethra the patient will be seized with a severe chill, which is followed by fever and sweat. There may be but a single paroxysm, in which case the patient's condition will have returned to normal in from a few to twenty-four hours. In other cases the

chill, fever, and sweat recur at irregular intervals. The former is probably due to the absorption of a minute dose of poison through a fresh wound of the urethra caused by the instrumentation. The latter is undoubtedly a genuine septic infection. The micro-organisms or their toxins are absorbed through the urethral lesion, and produce either a septicæmia or pyæmia of the gravest type.

Literature of '97-'98-'99.

Urinary rigors are regarded as a form of septic poisoning due mainly, if not entirely, to the bacillus coli. The presence of the bacillus can be demonstrated in the vast majority of cases. It is certainly capable of producing toxins of sufficient virulence even when the dose is infinitesimally small. Everything that favors absorption increases the likelihood of rigors. Conversely, everything that checks it tends to prevent them. It is an error to speak of rigors like these by the name of urinary fever: fever due to reabsorption of some of the constituents of the urine. It overlooks the true cause, gives an entirely wrong impression, and, what is much more important, leads to a wrong method of treatment. C. Mansell Moullin (*Lancet*, Dec. 18, '97).

Patients who have suffered for a long time with stricture of the urethra and whose kidneys have become infected secondarily seem to be especially predisposed to this accident. The extreme gravity of the severer forms of urethral fever should constantly be borne in mind and every effort should be made to prevent its occurrence.

The treatment should be prophylactic, inasmuch as we are helpless in the presence of a fully-developed case of the severer forms. The most rigid antiseptics in urethral instrumentation and the internal administration of one of the urinary antiseptics will usually prevent urethral fever.

Literature of '97-'98-'99.

Free division of a stricture often puts an end to the rigors that occur when a catheter is passed, because removal of the obstruction does away to a large extent with the increased pressure when micturition takes place. Tying in a catheter prevents rigors for the same reason. If micturition is delayed for some hours after a stricture has been divided there is much less risk of a rigor than if urine is passed immediately. For the same reason rigors that occur on the second or third day are generally less severe and often need some additional cause, such as a sudden chill, to start them.

The strongest argument in favor of the septic origin of these rigors is the fact that they can be prevented by adopting suitable antiseptic measures. The first essential is to clear out the intestinal canal thoroughly.

For some days beforehand the patient should be given 2 or 3 grains of salol six or eight times in the twenty-four hours. If the urine is alkaline from the presence of a fixed alkali benzonaphthol is to be preferred, given in cachets. Three days before the operation the patient should be given a calomel purge, followed by an effervescing draught, and again the night before.

The patient should be very warmly clad for the operation. Immediately before the operation the glans penis, prepuce, and meatus should be thoroughly washed with soap and water and then with corrosive-sublimate solution (1 in 1000). The urethra must be cleansed as perfectly as it can be with a boric-acid douche and a catheter that admits of a return-current along the walls.

The instruments should be sterilized and kept from contamination by wrapping them in a carbolized towel. At the end of the operation the bladder should be emptied by means of a catheter and two drachms of a 2-per-cent. solution of nitrate of silver injected into the deep part of the urethra and on to the face of the stricture and left there.

Micturition should be postponed for as long as possible after the operation. C. Mansell Moullin (*Lancet*, Dec. 18, '97).

If the disease has already become established, the indication for the use of some remedy to render the urine sterile is imperative. Boric acid and salol have each been extensively used for this purpose. Ten grains of either may be administered four times a day. Recently urotropin and cystogen have been employed extensively, and apparently with very satisfactory results. The dose of each is 20 to 30 grains in twenty-four hours. The urethra and bladder should be thoroughly irrigated at frequent intervals with an antiseptic solution. One of the most efficient is potassium permanganate, 1-5000 to 1-2000. If absorption seems progressive in spite of these measures, it may be necessary to perform an external perineal urethrotomy for better drainage.

Literature of '97-'98-'99.

Urotropin is of value as an antiseptic for the urinary channels. Urinary antiseptics should be used for several days before operation upon the urinary tract. Urotropin has a lasting effect, 15 grains often extending its influence over a period of twenty-four hours. Nicolaier found that urine containing this substance could be kept for months without decomposition. It increases the acidity of the urine, and therefore in subacute cases must be employed cautiously or else combined with an alkali to prevent vesical irritation.

The dose of urotropin ranges from 15 to 90 grains in twenty-four hours, it seldom being necessary to employ a larger daily amount than 20 grains in order to obtain its antiseptic effects. This amount may be taken at a single dose in the morning dissolved in water, or may be given in divided portions during the day either in solution or in capsules. The most satisfactory results are reached by the administration of four 5-grain capsules each day, the last dose being taken late at night and each being followed by a copious draught of water. A. R. Elliott (No. Amer. Pract., Oct., '97).

The conclusions regarding urotropin from personal observations and others are as follow:—

1. Urotropin produces no untoward symptoms when administered in amounts of 30 grains *per diem*.
2. It renders an alkaline urine acid, no matter what the cause may be.
3. It inhibits the development of the micro-organisms of ammoniacal cystitis, and in this way clears up cloudy urine.
4. It is indicated as a preparatory disinfectant in operations on the urinary tract; in pyelitis, cystitis, and other inflammations of the urinary tract, irrespective of their cause, and in other conditions tending to the formation of urinary calculi. R. W. Wilcox (Med. News, Nov. 12, '98).

The constitutional treatment is also important. The patient will require a nourishing diet. Three pints of milk per day will not be too much, and 3 to 6 eggs should be given, either with the milk or separately. Stimulants must be administered freely. Half a pint of whisky or brandy or even more may be given, with advantage, in twenty-four hours, the amount being determined by the effect. Full doses of strychnine should be given, and digitalis may be added if there is any evidence of enfeebled circulation. Careful attention must be paid to the functions of the kidneys and bowels.

Injuries and Diseases of the Bladder.

Exstrophy of the Bladder.—Exstrophy, or absence of the anterior wall of the bladder, is a congenital defect occasionally met with. It results from the failure of the lateral portions of the urogenital cleft to unite. It is most frequently observed in male children, and is accompanied by absence of the roof of the urethra (epispadia) and by a defect in the anterior abdominal wall in front of the bladder, so that the mucous surface of the posterior wall of the bladder protrudes in the hypogastric and pubic

regions. The ureteral orifices can usually be found by careful inspection. Subjects of this deformity are usually poorly developed and are apt to have other defects also. In some cases the scrotum is cleft, so that the external genitals of a male child may resemble somewhat those of a female. The testes are occasionally undeveloped, and may or may not occupy their proper position in the scrotum. Inguinal hernias are common. The constant contact of the urine with the surrounding skin gives rise to a troublesome eczematous condition.

The palliative treatment consists in the application of some form of urinal to collect the urine or of other means to keep the patient as dry as possible. The surrounding skin should be frequently bathed, and, if irritated, zinc ointment should be applied.

The radical treatment consists in some form of plastic operation, intended to close in the bladder sufficiently to enable the urine to be caught in a suitable urinal. Of the various operative procedures, Wood's method is that usually recommended. In suitable cases it is advisable to free the edges of the bladder and unite them by sutures, leaving an opening below for the escape of urine. A few writers advise the transplantation of the ureters into the rectum. This is, however, a very serious operation, and one that has not yet been performed with sufficient frequency to establish its claim to a permanent place among legitimate operative procedures.

Wood's operation is performed by taking a flap of sufficient length and width, from the anterior wall of the abdomen, to cover in the extroverted border of the bladder, and the flap is folded over the protrusion so that the skin is next to the mucous membrane and the raw surface outward. Two rounded lateral flaps with

the attached portion corresponding to the base of the scrotum and inguinal region on either side are next made. The inner end of each incision is continued along the corresponding side of the urethral groove for one-half its length. These flaps should be large enough and so fashioned as to meet in the middle line over the inverted middle flaps in their new positions. The middle flap is turned downward so that the skin covers in the bladder, and the free margin sutured to the incisions on either side of the roof of the penis. The lateral flaps are then brought together in the middle line overlying the first flap and sutured. The raw surfaces from which the flaps were taken are then drawn together as far as possible, using either sutures or harelip-pins.

The epispadic condition remains to be remedied by operation at a later period.

After personal operation for extroversion of the bladder there is less risk of septic infection spreading from the bowel up to the kidney than there exists from the decomposition of urine and ulceration of mucous membrane, which so frequently complicate extroversion of the bladder. In the performance of the operation an elliptical portion of the vesical mucous membrane at the point of entrance of the ureters into the bladder, along with the nutrient vessels of the ureters, are to be carefully separated and to be inserted along with the ureters into the opening made in the sigmoid flexure. Maydl (*Wiener med. Woch.*, '96).

Literature of '97-'98-'99.

Of all the radical methods which involve an incision of the bladder and a transplantation of the ureters to the rectum, Maydl's operation is by far the most complete, rational, and satisfactory from the technical point of view; Maydl's operation offers the best conditions for the complete correction of the associate epispadias: it should not be applied indiscriminately to all cases, but only to those

patients whose general condition is such as to warrant a long, tedious operation likely to be attended by serious shock and whose eliminating organs, especially the kidneys, are normal and capable of effective elimination. Rudolph Matas (*Phila. Med. Jour.*, June 10, '99).

Rupture of the Bladder.—Rupture of the bladder is usually the result of traumatism. The common causes are a forcible blow in the hypogastrium and fracture of the pelvis when the bladder is full. Rupture from overdistension is an accident of great rarity, and usually occurs in cases of obstruction due to enlargement of the prostate. The tear may involve that portion of the bladder-wall covered by peritoneum, in which case the lesion is said to be intraperitoneal, or, if the portion of the bladder involved is not in relation with this membrane, the lesion is described as extraperitoneal. The intraperitoneal ruptures result from the different forms of traumatism, excepting fractures of the pelvis, and constitute about four-fifths of the whole number. The extraperitoneal cases are observed chiefly in fractures of the pelvis and in rupture from overdistension.

Literature of '97-'98-'99.

Statistics show that in Berlin in 10,867 surgical cases there were only 3 ruptured bladders, and in London in 16,711 cases only 2. In the Johns Hopkins Hospital, among 7000 surgical cases there have been 3 ruptured bladders.

Ninety cases of extraperitoneal rupture of the bladder have been personally collected; 84 occurred in males, and nearly 50 per cent. between the ages of twenty and forty. Twenty-three were due to crushing by weight falling on the body; 25 by being run over by a wagon; 22 from falling from a height. Mitchell (*Annals of Surg.*, Feb., '98).

The symptoms vary according to the nature of the accident. In cases of in-

traperitoneal rupture the patient will display more or less profound shock, severe hypogastric pain, and a desire to urinate. If a catheter be introduced carefully, a little blood or blood-stained urine may escape or nothing at all may be withdrawn. If now a few ounces of boric-acid solution be slowly introduced there will be no return-flow. This observation is diagnostic of rupture of the bladder if the manipulations are properly carried out. Symptoms of peritonitis may develop speedily or may be delayed, depending on the condition of the urine.

Extraperitoneal ruptures—that is, those involving the base—are accompanied by less shock, unless there be other injuries, than the intraperitoneal variety. In cases of extraperitoneal rupture the rent in the bladder communicates with cellular tissue, but not with any cavity; so that the bladder does not empty itself as completely as in the intraperitoneal rupture. The urine, however, and any boric-acid solution that is used to irrigate the bladder, will return through the catheter more or less blood-tinged. The escape of the urine in the tissues gives rise to a cellulitis which will be manifested by pain and fullness locally and by an elevation of temperature, and the usual constitutional symptoms of a severe inflammation.

Rupture of the bladder is always a very serious accident. The intraperitoneal variety has a much higher mortality than the extraperitoneal, as would be supposed.

Literature of '97-'98-'99.

Of 90 cases of extraperitoneal rupture of the bladder, 75 died; *i.e.*, 83.3 per cent. Fifty-three of the fatal cases died in the first week—29 on the first day. Eleven cases were operated on within twenty-four hours; 4 recovered. Of 7 cases operated on between two and five days, none recovered. Of 7 cases oper-

ated on within two weeks, 5 recovered. Injuries complicated by multiple fracture in 42 cases: The mortality of the unoperated cases was 76.2 per cent.; that of the operative cases 64.9 per cent. Mitchell (*Annals of Surg.*, Feb., '98).

Treatment.—Intraperitoneal rupture of the bladder should be treated by immediate laparotomy, as the condition is otherwise certainly fatal either from peritonitis or from absorption of the urine, even if sterile. The rent in the bladder should be sewn up after the Czerny-Lembert method of intestinal suture, and the peritoneal cavity irrigated with normal salt solution. A catheter should be introduced and retained for a week or ten days while the wound is healing.

In cases of intraperitoneal rupture of the bladder the following is considered as the proper course to pursue: The peritoneum should be opened and the rent in the bladder securely closed by closely-applied silk sutures; the abdominal cavity is to be irrigated with hot sterilized water; only the upper portion of incision in its walls is to be closed, the lower end being filled with a tamponade of gauze passed to the bottom of the pelvis; the bladder should be drained by means of a large flexible catheter passed through a perineal incision, and maintained there by any device that fulfills the indication. C. K. Briddon (*Annals of Surg.*, Dec., '95).

Literature of '97-'98-'99.

The treatment of vesical rupture should be about as follows: Coeliotomy is the best method of reaching the bladder. It is best always to suture the bladder. The suturing of the bladder-wall and of the peritoneum should be done separately. In case peritonitis has already set in, rendering the separate sewing of the tear of the peritoneum impossible, a tampon should be put into the peritoneal cavity. The after-treatment should consist in the extensive use of iodoform-gauze packing. Fritz Berndt (*Archiv f. klin. Chir.*, B. 58, H. 4, '99).

Extraperitoneal ruptures are treated by the permanent catheter; irrigations of the bladder and careful examination should be made from day to day for appearances of extravasation and inflammation either in the space of Retzius or in the perineum. Digital exploration of the rectum will reveal any collection in the pelvis. Such evidence would call for immediate and free incision.

Literature of '97-'98-'99.

In a case of extraperitoneal rupture of bladder complicated by fracture of the pubis the rent in the bladder-wall was sutured, and the supravescical space drained through the median incision, and through incision in each inguinal region. The day following the operation the patient was placed in a bath at a temperature of 100° F., and was kept there almost continuously for a period of forty days. The immediate effects of the bath were most pronounced, the condition of the patient, which was serious and attributed to the absorption following urinary extravasation, promptly improved. The ultimate result was most satisfactory, the fragments of the pubis thoroughly uniting and the suprapubic wound entirely closing. He eventually walked without any evidence of disability. This is the third case in which the continuous bath has been employed in an injury of this nature, and all evidence that this measure is a prime factor in promoting better drainage, while it at the same time prevents undue absorption. J. F. Mitchell (*Johns Hopkins Bull.*, Jan., '98).

Immediate operation should be performed in all cases where a rupture of the bladder is known to exist.

In all intraperitoneal cases immediate laparotomy should be performed and the wound in the bladder sewed up.

In all cases where there is any doubt as to whether the rupture is extraperitoneal or intraperitoneal, immediate laparotomy should be performed.

In all extraperitoneal cases where there is any doubt as to the direction and extent of the extravasation, laparotomy should be performed at once for explora-

tion and diagnosis, and should be followed by the operation appropriate for the drainage of the case.

There remain only the cases where the rupture is known to be extraperitoneal, and where the extravasation is known to be limited to the prevesical space, as the ones where it is safe to drain above or below, or both, without an investigation of the bladder and its neighborhood through an abdominal incision. Thorndike (*Jour. Cutan. and Gen.-Urin. Dis.*, May, '99).

Vesical Calculus.

When certain of the solid constituents of urine are present in excess, a portion is thrown out of solution in the form of crystals. When a number of these crystals become adherent, a small calculus is formed around which, as a nucleus, additions continue to be deposited until a stone of some size is formed. A stone may form in the bladder primarily or it may develop around a nucleus which has had its origin in the pelvis of the kidney and has passed into the bladder.

Vesical calculi are composed in the order of frequency of uric acid, the earthy phosphates, and oxalate of lime. Stones composed of carbonates, cystin, xanthin, and indigo are occasionally met with.

The great majority of calculi are composed of uric acid. This form is usually oval, of moderate size, and brownish in color. The surface, as a rule, is smooth. Uric-acid calculi are met with largely among children of the poorer families, and in adult life chiefly in those whose habits place them in the class popularly known as "free livers." The probable explanation of the frequency of stone in the former is that the food is unsuited to the time of life. In the better classes of society milk forms a large part of the diet of the child until it is several years old, whereas among the most dependent

class the use of milk is discontinued as soon as the child is able to take solid food. The nitrogenous elements which are thus taken in beyond the requirements of the system are excreted in the urine in the form of uric acid, and, being in excess, tend to form calculi. In the latter class the liberal indulgence in rich foods and wines furnishes an amount of nitrogen far in excess of the needs of the economy, and the same condition results.

Phosphatic calculi occur in alkaline urine; they are therefore especially associated with the period beyond the middle life. They are apt to be associated with hypertrophied prostate, in which condition the constant presence of residual urine in the post-prostatic pouch with the accompanying ammoniacal decomposition which is so frequent in these cases furnishes all the conditions necessary for the formation of a phosphatic stone. These may be of any size. A number of instances have been recorded of phosphatic calculi which have weighed several ounces and less frequently as much as a pound or two.

Oxalate-of-lime calculi, like the uric-acid stones, originate, as a rule, in the pelvis of the kidney. They do not attain a large size; they are commonly more or less round in outline and dark brown in color. The surface is frequently mammillated, which appearance has given rise to the name of "mulberry" calculus. These stones form in urine containing a free deposit of oxalate-of-lime crystals, which is termed oxaluria. This condition appears to be associated with disorders of digestion and assimilation, and is also present in certain forms of neurasthenia.

These different constituents are not infrequently found in association. For example, it is not uncommon to find cal-

culi composed of alternate layers of uric acid and oxalate of lime, and either of these, or even a mixed calculus, is very apt to form a nucleus for the formation of a phosphatic stone.

The causes of stone in the bladder have already been hinted at. The continual use of food inappropriate to the age or condition of the individual, and the taking of excessive amounts of articles of diet which in their elimination produce uric acid or oxalate of lime, are the potent factors. In the formation of phosphatic stones any obstruction to the free emptying of the bladder, chronic cystitis, and other causes of alkaline urine play an active rôle. Considerably more than half of the vesical calculi met with are in patients under twenty years. By far the larger number of cases are met with in males. This is probably accounted for by the much greater facility with which a minute calculus can escape from the bladder through the much shorter and more dilatable female urethra. Stone in the bladder is of more common occurrence in certain sections of the world than in others.

Symptoms.—Symptoms of stone are frequent urination, pain, and changes in the character of the urine. The frequency of micturition varies greatly in different cases. It is usually greater during the day, when the individual is active, than at night, when he is resting. In some instances urination is attended by considerable tenesmus. This is especially the case in children, and if the condition is pronounced is apt to lead to prolapse of the rectum from straining. Occasionally the stream of urine will be suddenly arrested by the stone rolling into the vesical neck. The pain may be constant or paroxysmal or both. As a rule, there is pain toward the end of micturition, which may be either hypo-

gastric or just behind the glans. Sometimes there is a constant dull ache felt in the hypogastric region. This is especially the case with patients whose occupation subjects them to constant jarring motions, such as trainmen and those who drive over rough roads. The pain, like the frequency of urination, is increased by activity and lessened by rest.

The urine is apt to contain some traces of the material from which the stone is formed; so that the microscope may show either uric acid, oxalate of lime, or phosphates.

The presence of the stone usually gives rise to hæmaturia. The quantity of blood present is, generally, very slight, and is not apparent to the naked eye. In cases of long standing or in any case if cystitis has developed, more or less pus will be present.

Priapism has been occasionally observed in children, and in many cases various reflex pains are present.

The actual presence of a stone in the bladder is to be determined by a vesical sound or stone-searcher. This instrument has a shaft rather longer than the urethral bougie and a shorter curve. It should not be larger than about No. 13 of the French scale. The examination should be made with the patient in the recumbent position. It is desirable to have some urine in the bladder, or in the absence of this to inject a small quantity of sterile boric-acid solution. In passing the instrument careful attention should be paid to every detail of antisepsis. When the instrument has been introduced the beak is to be turned downward and each portion of the bladder systematically examined. The presence of a stone will be indicated by the sensation imparted through the instrument to the hands of the surgeon, but especially by an audible "click" produced

by gently striking the stone with the end of the instrument. The diagnosis should be made solely upon the latter, inasmuch as a ribbed bladder, especially if there be any phosphatic crusting, may give to the sense of touch the evidence of the presence of this stone.

Literature of '97-'98-'99.

In studying a series of 21 cases of encysted vesical calculus, it was noted that many of the symptoms ascribed to vesical calculus were wanting. In some cases the stone was so deeply imbedded in the bladder-wall as to elude the beak of the sound, and only proclaimed its existence when an attack of cystitis had supervened. The majority of these sacculi that are found to contain calculi are believed to be formed by the adhesion of the calculus to the bladder-wall and the formation of the sacculus for the calculus as it grows larger. There are no differential-diagnostic symptoms which separate this condition from ordinary cystitis. The difficulties in the way of diagnosis were enhanced by the fact that in several instances washing out the bladder was quite sufficient temporarily to restore the urine to a healthy condition. In several instances the stones were so thickly covered with mucus that they did not give an audible sound when struck with an exploring instrument. The fact that the presence of a stone was not known in half the cases operated upon and the difficulties that lie in the way of diagnosis show that suprapubic cystotomy and exploration should be performed in all cases of cystitis that become chronic and are rebellious to treatment. W. B. Clarke (Brit. Med. Jour., May 13, '99).

Vesical calculi have been personally photographed successfully in eight cases. The more transparent the body it is desired to photograph, the shorter must be the exposure; in order, therefore, to obtain successful shadows of calculi, the exposure must be shorter than that required for the vertebræ and pelvis. Failures in the past may have resulted from the attempt to photograph calculi as well

as the bones, at the same time and on the same plate. Hans Wagner (Centralb. f. Chir., Feb. 25, '99).

While a stone may exist in a bladder for a long period, without giving rise to much irritation, sooner or later there will be cystitis, and probably infection of the kidneys; so that, if the patient's health will at all permit, a vesical calculus should be removed as soon as possible after its presence has been detected.

Treatment.—Efforts to dissolve the stone in the bladder either by internal medication or by irrigation are not to be recommended. There are two methods available for the removal of stone in the bladder, namely: litholapaxy and lithotomy.

Litholapaxy is the operation to be recommended in the vast majority of cases. The exceptions to this advice at the present time are few. In children below four years of age, however, it is usually impossible to introduce an evacuating catheter of sufficient size to carry out the fragments. Above this age, however, with proper instruments, litholapaxy is just as safe and satisfactory as in the adult. If the patient has a stricture of the urethra it will usually be possible to treat this preparatory to operating for the stone. Occasionally the presence of hypertrophy of the prostate will interfere with the introduction of the lithotrite or the evacuating tubes, and thus prohibit this operation. In suitable cases White recommends the operation of vasectomy or castration, according to the conditions present, and after the prostate has undergone sufficient atrophy to proceed with the litholapaxy.

Cystitis does not constitute a contra-indication to the crushing operation, as it can be treated beforehand by urinary antiseptics internally and bladder irrigations.

The advantages of litholapaxy are its safety, in experienced hands; the avoidance of a wound, and the short convalescence, uncomplicated cases being able to leave the house in from two to five days after the operation. In contradistinction to this a cutting operation confines the patient to bed for some weeks, and there is always some danger of a urinary fistula remaining.

Literature of '97-'98-'99.

From a study of the results personally obtained in 133 operations for stone, it has been found that not more than 3 per cent. of cases should be unsuitable for litholapaxy. The cases that are unsuitable may be tabulated as follows:—

1. Those with such condition of the passages that the lithotrite necessary for crushing the stone cannot be passed.

2. The stone may be so large that the largest lithotrite will not lock on it; or it may be so hard that it will resist the greatest force that the instrument will bear or the operator be able to exert.

3. A stone in the bladder may be complicated with one or more in the membranous or prostatic portions of the urethra, which cannot be pushed back into the bladder; or the stone may be encysted, or may be complicated with a tumor of the bladder.

4. A state of affairs may exist that makes it desirable to establish complete drainage and rest the bladder after removal of the stone, such as extensive cystitis with ammoniacal urine, and especially if associated with stricture of the urethra.

5. Such a condition of irritability of the bladder that the organ will retain no fluids even under profound anæsthesia. The stone being clasped by its hypertrophied walls in this latter case, an expert might perform litholapaxy without increasing the patient's risk; but perineal lithotomy would have considerable advantages in such cases in allowing drainage and rest to the bladder.

Of the cutting operations, the perineal method is preferred, the suprapubic being restricted to the following conditions:

(a) exceptionally large calculi, and these would probably be better dealt with by perineal lithotripsy; (b) encysted calculi; (c) those associated with tumor of the bladder, which it is advisable to remove at the same time. Cunningham (Brit. Med. Jour., Aug. 7, '97).

A table compiled from the Official Medical Reports published in India shows that the mortality in 10,073 litholapaxies was 3.96 per cent.; in 7201 lateral lithotomies, 11.02 per cent.; and in 147 suprapubic lithotomies, 42.17 per cent.

The great decrease in the mortality after litholapaxy is attributed to an increasing skill in manipulation.

The falling off in the number of suprapubic lithotomies is ascribed to the greater proficiency attained in litholapaxy and the power to crush large stones which the new lithotrites now have. Perineal litholapaxy is advocated for stones that cannot be crushed by instruments passed *per urethram*. Keegan (Lancet, Jan. 30, '97).

Lithotomy.—Cases will occur, however, in which the crushing operation is inappropriate. In addition to the contraindications already mentioned, if it is suspected that the nucleus of the stone is a foreign body of any kind, introduced into the bladder by accident or otherwise, it will be necessary to perform lithotomy. In rare instances also it will be impossible to crush the stone either on account of its hardness or its large size.

In cutting for stone the surgeon may approach the bladder either by the suprapubic route or through the perineum. For the removal of stones more than an inch and a half in diameter and for inspecting the bladder if any such indication exists, the suprapubic method should be selected. For the removal of smaller calculi many surgeons prefer the perineal incision. Others, however, prefer to open the bladder above the pubes in every case in which it is necessary to do a cutting

operation. If the bladder-walls are healthy, it will be possible in many cases to unite the bladder incision by sutures in the suprapubic operation, and thus overcome one of the serious objections to lithotomy.

Before subjecting a patient to any operation for stone in the bladder it is very desirable to administer a urinary antiseptic for a few days; either salol or boric acid in doses of 10 grains three or four times a day will meet the requirements. Urotropin or cystogen, a combination of ammonia and formalin, also seems to be an efficient and powerful agent. The dose is from 20 to 30 grains in twenty-four hours. In cases complicated by marked cystitis it would also be advisable to practice irrigation of the bladder two or three times daily for a few days before operation. This is particularly to be advised if litholapaxy has been decided upon. The restriction of the diet to milk chiefly and more or less absolute rest for a few days will also add to the success of the operation. As in all cases in which ether is to be administered, it is desirable to administer a purgative the day preceding the operation and to withhold all food for at least six or eight hours before administering the anæsthetic. If a cutting operation is proposed, the parts should be cleanly shaved and prepared according to the orthodox methods of carrying out antiseptic operations. All of the instruments and other articles to be used in the operation should be as carefully sterilized as for any other operation.

LITHOLAPAXY.—The instruments required for this operation are a lithotrite, evacuator, evacuating catheters, ordinary catheters of different kinds, a vesical sound, warm boric-acid solution, syringe for irrigating the bladder, and suitable receptacles. A basin or jar with three

or four thicknesses of gauze secured over the top should be prepared to receive the stone. It should also be the rule to have at hand the necessary instruments for lithotomy in the event that the attempt to crush the stone should fail for any reason. It has also happened that the blades of the lithotrite became jammed when separated so that it was absolutely impossible to withdraw the instrument and it was necessary to do a suprapubic operation at once for the purpose of sawing off the blades, above the curve that removal might be accomplished.

There are a number of lithotrites upon the market, the two chief forms being those of Bigelow and of Weiss. Either will be found entirely satisfactory. For operating upon children a special instrument has been designed by Weiss. Of the various forms of evacuators, that designed by Bigelow is perhaps the most satisfactory. It should be fitted with several evacuating catheters of different sizes.

Ether having been administered, the first step should always be the introduction of the stone-searcher in order to be certain that the stone is still in the bladder. Unless the surgeon can demonstrate its presence by sound to at least one person besides himself, it should be the rule to abandon the operation and allow the patient to come out of the influence of ether. In such an event, subsequent examinations may be made and the future course decided accordingly. If the stone has been detected, however, the next step should be to introduce a suitable catheter properly lubricated and withdraw the urine. The bladder should then be irrigated with warm boric-acid solution—10 to 15 grains to the ounce of sterile water—until the fluid returns clear. A quantity of the solution should then be introduced into the bladder and

allowed to remain, the catheter being withdrawn. In the adult this quantity may be about 6 fluidounces; for a child 2 or 3 ounces will be sufficient. The patient should be in the supine position, with the legs extended, but slightly separated. The lithotrite is then lubricated and carefully introduced into the bladder. A surgeon who is right-handed may introduce the lithotrite while standing to the patient's left, but he should then pass to the right side of the patient for the subsequent manipulations. The instrument, having been introduced, should be moved back and forth slightly to see that it is free, and the beak then turned toward the base of the bladder. The ratchet which binds the two blades should be released and the jaws separated one or two inches and again brought together. If the stone is not caught between the jaws the manipulation is to be repeated, shifting the points in order to sweep the different portions of the base of the bladder. When the stone is caught, the blades are to be held firmly together and locked, after which the instrument is revolved until the beak points anteriorly, when the stone is crushed by screwing down the handle. The blades are then released, turned again toward the base of the bladder, another fragment picked up, turned forward, and crushed as before. This procedure is continued until the instrument fails to seize any fragments too large to be withdrawn through the evacuating tube. The blades of the instrument are then tightly closed and locked, after which it is withdrawn. The largest evacuating catheter that will pass easily should then be introduced, care being taken to prevent any of the fluid from escaping from the bladder, and the evacuator—previously filled with warm boric-acid solution—attached. By

alternately compressing and relaxing the bulb the fragments will be drawn into the latter and will fall into the glass receptacle below. This manipulation should be continued until no further fragments are brought out. If there is sufficient bleeding from the mucous membrane of the bladder to color the boric solution deeply, the bulb may be emptied and refilled, the stop-cock on the outer end of the catheter being closed in the meantime to prevent the escape of the fluid. If during the evacuation of the fragments a click is repeatedly heard as the bulb is relaxed, it will indicate that a fragment remains which is too large to pass through the eye of the catheter, and the lithotrite will have to be reintroduced in order to reduce this. After the bladder appears to be empty of fragments the stone-searcher should be again introduced, and if any portion of the stone remains it should be crushed and removed. It is undesirable, however, to reintroduce the lithotrite oftener than is absolutely necessary; so that the crushing process should be very carefully carried out and as far as can be determined fully accomplished before withdrawing the instrument. When the operation is completed the bladder should again be irrigated with warm boric-acid solution until the fluid which returns is clear, when 2 or 3 ounces may be introduced and allowed to remain. The patient is then returned to his bed, and, if the operation has been a long one, external heat applied and hot compresses placed over the hypogastrium. The urinary antiseptic should be continued and the diet restricted to milk for two or three days, until it is evident that the convalescence is assured. Patients otherwise healthy and who do well may be allowed out of bed on the second or third day.

LITHOTOMY.—Cases inappropriate for litholapaxy will have to be subjected to one of the forms of lithotomy. In general it may be stated that in adults the perineal route should be selected under the following circumstances: 1. In cases of deep urethral stricture rebellious to dilatation, in which, by selecting the median method, the stricture may be divided at the same time. 2. In cases of stone of moderate size and of such hardness and density as to make too great demands on the strength of the lithotrite or of the operator. This condition occurs very rarely. 3. In cases of atony of the bladder where there is little or no expulsive power, where there is already a chronic cystitis, and where the stone is of medium size.

Suprapubic lithotomy should be selected: (1) when the stone is an unusually large one, and at the same time is believed to be of exceptional hardness; (2) in cases of marked prostatic hypertrophy with pouched bladder, chronic cystitis, and large stone; and (3) sometimes when the kidneys are diseased. In children, too young to permit of the introduction of the instruments necessary to perform litholapaxy, the lateral perineal operation would be the method of choice.

PERINEAL LITHOTOMY (LATERAL).—The instruments required for this operation are a grooved staff, lithotomy-knife, probe-pointed bistoury, lithotomy-forceps, lithotomy-scoop, a large-sized pure-rubber catheter, a catheter *en chemise*, hæmostatic forceps, scissors, ligatures, and sutures.

The patient having been etherized, the vesical sound is introduced, and if the stone is detected the operation is proceeded with. The urine is withdrawn, the bladder irrigated with warm boric-acid solution, after which 6 or 8

fluidounces are allowed to remain. The patient is then so arranged that the buttocks project slightly from the end of the table; the thighs are flexed upon the abdomen and the legs upon the thighs and retained in this position by assistants. The grooved staff is then introduced and placed in proper position by the surgeon, after which it is held by an assistant whose duty it is to accurately retain it in this position. The handle should be held either perpendicularly or inclined slightly toward the patient's right groin, and should be drawn well upward so that the curve rests against the under surface of the symphysis pubis. The surgeon should then fix in his mind the central point of the perineum, which is midway between the anus and the perineo-scrotal junction, and in the adult is about an inch and a half in front of the former. Finally observing that the staff remains in proper position, a lithotomy-knife is introduced vertically in the direction of the staff at the central point of the perineum and just to the left of the raphé and carried downward and outward across the left ischio-rectal space, terminating on a line between the anus and the left ischial tuberosity and rather nearer to the latter than the former. This incision is deepest at the beginning and becomes shallower at the posterior extremity. It passes through the skin, superficial fascia, transverse perineal muscle, nerve, and vessels, the lower edge of the anterior layer of the triangular ligament, and the inferior hæmorrhoidal vessels and nerves.

The surgeon then introduces the left index finger into the wound, and locates the groove of the staff. The knife is now passed along the finger and made to engage in the groove, after which it is pushed along toward the bladder, being careful not to allow it to escape from the

guide until the gush of fluid indicates that the bladder has been reached, when it is made to cut downward and outward in the line of the first incision. This divides the membranous and prostatic portions of the urethra, the compressor-urethræ muscle, the posterior layer of the triangular ligament, a few fibres of the levator-ani muscle, and the left lobe of the prostate. The left forefinger should then be introduced into the bladder, using the staff as a guide, and when the stone is felt the staff should be withdrawn, the lithotomy-forceps introduced along the finger and made to seize the calculus, which is then extracted.

In children in whom it is desirable to operate through as small an incision as possible, the lithotomy-forceps may be introduced along the groove of the staff and the stone extracted without introducing the finger at all. Little difficulty is experienced in finding the stone in children, inasmuch as there is no pouching of the bladder. Occasionally it will be found that the stone is too large to extract through the incision, in which case it may be broken into two or more fragments by means of a lithotrite introduced through the wound. It is desirable, however, to extract a stone without fragmentation when possible; but this should not be done at the risk of injuring important neighboring structures. Finally the bladder should be explored in order to make sure that other calculi do not exist, the wound is inspected for any bleeding vessels that should be tied, a large rubber catheter introduced, the bladder irrigated, and a little iodoform gauze laid in the superficial portion of the wound around the catheter,—which should be held in place by sewing to the edge of the incision,—and a dressing applied. Usually the hæmorrhage which follows the incision subsides after the

patient's legs are brought together. If any pronounced bleeding continues from the deep portion of the wound, it is best controlled by introducing a catheter *en chemise*, which is made by introducing the end of a large rubber catheter for about two inches through the centre of four layers of sterile gauze about eight inches square and fixing the gauze in this position by tying firmly with a silk thread. This is then introduced into the wound and gauze packing placed firmly and evenly around the catheter and inside of the gauze.

Occasionally when the artery of the bulb has been divided, the hæmorrhage will be so free as to demand a ligature or the application of pressure-forceps, which may be allowed to remain one or two days. The internal pudic artery has been wounded by carrying the incision too far outward toward the tuberosity of the ischium. Bleeding from this source may be arrested in the same manner. The rectum has also been wounded by carrying the incision too far inward and by failing to keep the blade of the knife sufficiently lateralized; usually the wound in the rectum heals spontaneously.

Median lithotomy is performed by means of an incision directly in the middle line of the perineum. The patient is placed in the same position as for lateral lithotomy, the staff introduced and held vertically and drawn well up under the pubes. The left index finger of the surgeon is introduced into the rectum and the groove of the staff located at the apex of the prostate. A knife with a double cutting edge at the point and a cutting edge of about three inches on one side is introduced with the long cutting surface upward an inch in front of the anus and directed to the groove in the staff at the point lo-

cated by the finger. When the point of the knife has reached the groove of the staff, it is pushed onward toward the bladder so as to incise the apex of the prostate and then withdrawn, cutting upward for from three-quarters of an inch to an inch. A probe-pointed grooved director may then be passed into the bladder on the groove of the staff, to be used as a guide for the introduction of the finger or of the lithotomy-forceps. As this operation is made in the middle line, there is comparatively little hæmorrhage; still, on the other hand, it provides but very limited space in which to work, and is therefore suitable for removing calculi of the smallest size only. The incision also approaches very closely to the bulb anteriorly and to the rectum posteriorly, either of which may be injured if the knife is carried slightly beyond the limits mentioned.

SUPRAPUBIC LITHOTOMY.—The instruments required for this operation are scalpels, dissecting-forceps, hæmostats, retractors, rectal bag, lithotomy-forceps, lithotomy-scoop, catheters, syringe, stone-searcher, scissors, needles, sutures, etc.

The preparation of the patient has already been described. After anæsthesia the presence of the stone should be determined before proceeding. The next step should be the introduction of the rectal bag, previously oiled, well above the internal sphincter. A catheter is then introduced, the urine withdrawn, and the bladder irrigated with warm boric-acid solution, after which from 6 to 10 ounces are allowed to remain. A catheter or rubber tube should be tied around the penis in order to avoid expulsion of the solution. From 8 to 10 ounces of boric solution should then be injected into the rectal bag and retained. In operating in children the quantities

of fluid both in the bladder and in the rectal bag should be very much smaller, and, owing to the higher position of the bladder at this time of life, the rectal bag may be dispensed with altogether. The incision should begin in the middle line about half an inch below the symphysis pubis and in the adult may be carried upward about three inches. The incision is carefully deepened, either between the muscles or through them, until the transversalis fascia is reached. When this is divided the prevesical fat and connective tissue are exposed. It is desirable to reach the bladder by blunt dissection from this point, pushing upward the fat and connective tissue, which frequently contain a number of large veins, with the finger and handle of the scalpel; this procedure also raises the peritoneum out of danger. It should always be borne in mind that the peritoneal reflexion may be abnormally low in any case, and that it may be opened if due caution is not observed.

After the bladder has been exposed all bleeding should be controlled by pressure-forceps, the bladder-wall transfixed with a sharp hook, and a scalpel thrust vertically into the bladder, cutting downward toward the symphysis. The edges of the bladder-opening may then be caught with tenacula or transfixed with needles carrying strong silk threads. The forefinger may then be introduced, and the stone located and removed by the forceps. After being certain that the bladder is empty, if the walls are in a healthy condition, the incision may be united by chromicized cat-gut sutures. They should be passed close together and should include all of the coats except the mucous membrane. The abdominal wound is to be united by suturing, a small drainage-tube being introduced through the external wound

and retained until it is certain that the incision in the bladder is going to heal kindly. A catheter should be introduced through the urethra and retained for a week or ten days.

If the bladder-walls are unhealthy, or if there is a pronounced cystitis so that immediate suture is unsafe, the margins of the bladder-wound may be united by a few stitches to the deeper portion of the abdominal incision and a large drainage-tube introduced. The use of siphon-drainage is very desirable in preventing the urine from saturating the dressings and excoriating the patient's skin. The bladder should be frequently irrigated and the skin around the wound cleansed and protected by an antiseptic ointment. As soon as the condition will permit, the external drainage should be removed and the wound allowed to close.

For bladder drainage after suprapubic cystotomy the tubing and clamp of what is known as a fountain-syringe may be used. This comprises a bag to contain water and two pieces of rubber tube joined at a right angle. The upper end of the longer limb of the T-shaped tube is held vertically, and fixed to the bag; the shorter placed horizontally, and connected with a soft catheter in the bladder. The clamp is fixed so that it is all but occluded close below the irrigator-bag. The S-shaped tube of the outlet of Cathcart's arrangement is replaced by a simple hitch-knot tied loosely in the rubber-tube. One or two drops per second from the irrigator prevent the bladder from filling, so that it is not necessary to replenish the bag of the fountain-syringe oftener than once in several hours. It makes no difference in the working of the apparatus whether the bag is hung above the patient or lower. The catheter in the bladder should have a second opening made into it opposite the original one, to prevent blocking by a piece of mucous membrane being sucked in. Dawbarn (N. Y. Med. Rec., May 30, '96).

Drainage of the bladder can be at-

tained in a simpler manner than Cathcart's. Besides the rubber tubing, only three straight pieces of glass tubing with slightly-dilated ends are required. The S-shaped piece of glass tubing below the junction of the tubes coming from the irrigator and the bladder, respectively, is replaced by looping up a simple rubber tube by a piece of bandage. Keen (Ann. of Surg., Feb., '96).

Literature of '97-'98-'99.

Personal method of suturing the bladder, which has met with uniform success in the eight cases of suprapubic cystotomy in which it has been employed, as well as in experiments upon animals. The method consists of the following steps: First, the mucosa and muscularis are separated from each other for a distance of half a centimetre to two centimetres from either edge of the incision. This flap of mucous membrane is resected, and the mucous edges sutured with catgut. Second, the muscular flap is placed over the line of suturing in the mucous membrane and fixed there by three lines of sutures: a U-shaped suture which unites the base of the flap with the edges of the bladder-wound, a suture which fixes the free edge of the flap, and a third suture which unites the mucous-membrane portion of the flap with the bladder-wall. By this means the incisions in the mucosa and muscularis are kept from directly overlying each other, and urinary infiltration thus obviated. T. Jonnesco (Gaz. des Hôp., No. 2, '99).

The suprapubic operation, even though the stone be large, is not to be compared to the vaginal route when this canal is fully developed, as in the adult female, especially in cases of married women. In the suprapubic operation there is no natural drainage. The urine must be retained in a bladder already inflamed, where it acts as a still further irritant, or must drain out through the abdominal wound at the risk of urinary infiltration and of setting up inflammatory action in the site of the wound. In the vesico-vaginal route the urine flows out constantly at first, allowing no new irritation of the inflamed lining of the bladder

and permitting a free and ready escape of urine, pus, mucus, and any remaining portion of the calculus. T. J. Happel (Phila. Med. Jour., Apr. 29, '99).

Vesical Tuberculosis.

The majority of cases of tuberculosis of the bladder occur before the fortieth year. It is usually secondary to deposits elsewhere. In a small proportion of cases the disease seems to be primary in the bladder. Many of the secondary cases follow tuberculosis of the kidney or an ascending infection from the epididymis. More rarely there is a direct extension from the prostate or seminal vesicles.

Symptoms.—The symptoms of tuberculosis of the bladder develop insidiously and are so slight in the early stages that advice is rarely sought until the disease has lasted for some time. The earliest manifestation observed by the patient in most cases is increased frequency of urination. Pain usually follows sooner or later. It is mild in some cases and severe in others, depending upon the location of the disease. Deposits at the neck of the bladder always give rise to considerable pain. Pus and blood are invariably present in the urine, the quantity varying in different cases, and at different times in the same case. These are merely the result of the ulcerating process, and not of the tuberculosis *per se*. Cystitis develops sooner or later, when the symptoms are much more pronounced, the pain, frequency of urination, and tenesmus all being much increased.

There is nothing peculiar about the symptomatology of vesical tuberculosis. The diagnosis must rest upon the detection of tubercle bacilli in the urine of a person who has the symptoms of chronic cystitis. If bacilli are found, however, we are unable, in many cases, to

determine whether they emanate from a focus of disease in the kidney or in the bladder. On the other hand, bacilli are not detected in some cases of genuine vesical tuberculosis. It is quite possible to have tuberculosis of the kidney in conjunction with a non-tubercular cystitis. The diagnosis will usually be made first by excluding the common causes of cystitis—namely: gonorrhœa, vesical calculus, stricture of the urethra, and hypertrophied prostate—by the usual methods of detecting these conditions; and, secondly, by meeting with the evidences of marked cystitis with tubercle bacilli in the urine and without any symptoms referable to the kidney. A tubercular family history or the presence of a tubercular lesion elsewhere in the patient would point to a similar condition in the bladder. In looking for the presence of tubercle bacilli repeated examinations should be made before deciding that they are absent. Finally cystoscopical examination may yield valuable evidence, either by showing the presence of a tuberculous process or by establishing the absence of such a condition. If no cause can be found in the bladder it would be well to catheterize the ureters separately in order to locate the seat of the disease.

The treatment in the early stages is almost purely constitutional. The patient should be surrounded by the most favorable hygienic conditions; if it is possible to build the patient up by forced feeding, suitable climate, etc., the disease may be arrested and healing follow. The urine should be kept as healthy as possible by the administration of a urinary antiseptic and by the use of milk and water in liberal quantities. In the presence of a pronounced cystitis, the proper treatment for this condition should be instituted. Among the drugs employed

in the local treatment, iodoform occupies a prominent place. The introduction of a small quantity of a 10-per-cent. mixture in sterilized olive-oil or glycerin every few days should be tried. The bladder should first be thoroughly irrigated in order to prepare for the iodoform, and, if any evidences of irritation follow the treatment, it should not be repeated until this has subsided. Irrigations of bichloride of mercury, beginning with 1 part in 5000, is highly extolled by Guyon. It does not seem certain, however, that this could have any specific effect on the tuberculous process, and it is a question whether this treatment does more than to relieve the accompanying cystitis. For severe pain, tenesmus, and frequency of urination, suppositories of opium and belladonna may be necessary.

When the pain and frequency of urination become unbearable and fail to respond to treatment, it will be necessary to perform suprapubic cystotomy for the purpose of drainage; at the same time it may be possible to remove it, if superficial, by means of a curette. The rest afforded by prolonged drainage of the bladder is one of the most potent factors in aiding to bring about a cure. It is always a difficult matter to decide when the suprapubic opening may be allowed to close in cases that progress favorably. In general, this should not be until the evidences of cystitis have disappeared.

Epispadias.

Epispadias, or absence of the roof of the urethra, is occasionally met with. It may be either complete or partial. The partial variety shows absence of the roof of a portion of the urethra. In the complete variety the entire roof of the urethra is absent and there is also exstrophy or absence of the anterior wall of the bladder and the over-

lying portions of the abdominal wall; so that the mucous membrane of the posterior wall of the bladder presents in the hypogastric region. In the latter condition there is, of course, complete incontinence of urine.

Treatment. — In the partial forms of epispadias of sufficient extent to demand relief it is proper to advise closure of the defect by operation. If there is plenty of material the edges may be freshened and brought together over a catheter by means of sutures. If this method is not available, a flap may be taken from the anterior abdominal wall and turned downward to form the new roof of the urethra.

Thiersch's operation is performed in four stages. The first is the formation of that portion of the canal which normally is situated in the glans. An incision is made on either side of the median furrow through about three-fourths of the thickness of the glans. The central portion is depressed, while the two lateral portions are freshened and brought together over a short piece of catheter or rubber tubing.

The second stage is the formation of the remainder of the roof of the urethra. For this purpose two flaps are made from the integument on the dorsum of the penis. In length these flaps correspond to the amount of the defect in the urethra. The base of one flap corresponds to the margin of the urethral groove, while the free edges of the other flap correspond to the opposite margin of the groove. A catheter is now introduced into the bladder and made to lie in the urethral groove. The flap with its base next to the catheter is turned over the latter so that its raw surface is outward, while the free edge is held by transfix sutures armed with a needle at either end which transfix the base of the sec-

ond flap. The latter is intended to cover over the raw surfaces presented by inverting the first.

The third step aims to close the small space between the two previous operations. For this purpose the prepuce is incised transversely and the glans slipped through this incision. The margins of the defect are next freshened, the prepuce made to cover this, and the raw edges sutured to close the opening.

Fourth step: This consists in the closure of the space which still exists between the posterior portion of the new urethra and the orifice leading to the bladder. For this purpose a triangular flap is made, the base of which is placed to the left of the normal urethral orifice. This flap is inverted so that the raw surface is uppermost. A second quadrilateral flap with its base in the inguinal region is made to cover the inverted first flap, and the wound closed by sutures.

A sufficient period of time should be allowed between each of these steps for perfect healing.

Method of treating epispadias which has personally given good result. The operation consists in refreshing the edges of the penile furrow, extending it till the abdominal parietes are reached, then excising two parallel strips of skin corresponding in size to the freshened penile portion. Bringing the penis on the abdomen, the denuded portions come in contact, and the penis is sutured in place, the penile furrow being converted into a urethra running from below upward. A second act, at a later period, consists in dissecting the penis out of its new bed, and with it a strip of skin of the proper size continuous with the glans and divided in the direction of the umbilicus. This flap is now turned down and the two raw surfaces united to each other. Rosenberger (*Beit. z. klin. Chir.*, B. 15. H. 3, p. 735).

The method of operating for ex-

strophy of the bladder is described under that heading.

Hypospadias.

This is a congenital defect in which the floor of the urethra is absent. It is usually associated with curvature of the penis, the normal position of the urethra being represented by a fibrous band which has contracted, curving the organ downward. The deficiency may affect a very small or a large portion of the length of the urethra. Thus, the canal may terminate at any point between the normal position of the external meatus and the perineum. The different forms are classified according to the position of the orifice of the urethra into: (1) balanic, those terminating at the base of the glans; (2) penile, those terminating at any point along the pendulous urethra; (3) perineal, those terminating at some point in the perineum.

The cause of hypospadias is arrest of development. The diagnosis is readily made upon inspection. The patient is led to consult the surgeon on account of the abnormal point of exit of the urine.

Treatment.—It is usually unnecessary to interfere in cases of the balanic variety, inasmuch as the normal functions are not greatly interfered with.

Literature of '97-'98-'99.

A new operation for hypospadias of the glans penis as performed by Bardenheuer is as follows:—

The skin on the lower surface of the penis above the glans is dissected back and the urethra freed by dissection from the spongiosa for such a distance that it can be readily carried to the end of the penis. The gland is then perforated by a trocar, where the urethra should pass; the freed urethra is drawn through this canal and stitched in position. The skin is then united by a sufficient number of sutures.

The after-treatment consists in the em-

ployment of boric-acid ointment, frequently removed. The stitches are removed on the eighth to the fourteenth day. Breuer (Centralb. f. Chir., Nov. 5, '98).

Instead of forming a new urethra in balanic hypospadias, the existing one may be dissected free and extended so as to make it do the service of a new canal. First, a transverse incision is made across the lower surface of the glans, which embraces the hypospadiac opening. By pulling the lower wound margin downward, the urethra can be exposed and separated from its surrounding tissue without being injured. Then, after a longitudinal incision has been made alongside the median line of the groove, by dissecting the edges of the groove, two flaps are to be formed and cut off in order to give a freshened surface. Now the hypospadiac orifice of the urethra is drawn forward and sutured to the initial point of these freshened margins of the groove, and opposite to it another suture is introduced in the same manner. If, now, the posterior portion of the displaced urethra is slightly inverted in its longitudinal direction, the retracted margins of the integument are pulled together and united above the urethra. The shape of the wound, which at first was transverse, now becomes longitudinal, forming a support for the urethra, which is thus kept straight at the same time. The creation of a new channel not having been necessary, the insertion of a tube will be useless. Carl Beck (N. Y. Med. Jour., Jan. 29, '98).

The operation for glandular hypospadias personally recommended is as follows:—

The urethral orifice, together with its corpus spongiosum, is freed from its surroundings, the dissection being carried well backward. The glans is tunneled through, and the urethra is pulled forward, and the meatus is sewn to the external surface. The advantages claimed for the operation are:—

1. It does away with the necessity of operating in several sittings.
2. It insures greater certainty of union, other methods frequently requiring repe-

tition of the operation and secondary measures for closure of fistulæ.

3. As there is an absence of any canal requiring to be covered over, a catheter *à demeure* is unnecessary. No subsequent constriction of the opening is to be apprehended.

4. The urethra remains surrounded by its corpus cavernosum, and the new external orifice by erectile tissue in a nearly normal fashion,—the latter circumstance being highly desirable for the proper ejaculation of semen. Von Hacker (Beit. z. klin. Chir., B. 22, H. 1, '99).

In the other cases the treatment consists in straightening the organ and the formation of a canal in the normal position of the urethra. The straightening of the organ is accomplished by making one or more transverse incisions through the skin and any bands of tissue which tend to hold the organ in the abnormal position. It is occasionally necessary to carry the incision into the corpora cavernosa. The incisions should be united by sutures in a longitudinal direction.

According to Duplay's method, the subsequent steps are as follow: Second stage, the formation of a new meatus. If there is a well-marked depression through the glans, the free edges may be freshened, a small catheter laid in the groove, and the raw surfaces brought together and held in place by sutures or harelip-pins. This may be done at the same time that the organ is straightened, which will shorten the treatment. Third stage, the formation of a new canal. This should not be undertaken until some months after the organ has been straightened or until it is certain that the first operation has been successful. In carrying out the operation a catheter should be introduced through the canal forming the glans and passed into the bladder. It should lie in the groove representing the undeveloped urethra. An incision is then made parallel with

and a little external to the catheter on either side, and the flaps dissected up somewhat, but not enough to cut off the blood-supply at the base. These flaps are then made to fold over the catheter, and are united with fine catgut sutures. It is not essential that the flaps should join. The skin external to the two incisions should then be dissected up freely on each side, and the two flaps united in the middle line by fine mattress-sutures. Great care should be taken to keep the wound dry and prevent infection, as this would interfere with the success of the operation. The fourth step consists in joining the new canal at either extremity. The margins of the openings are freshened and the raw edges united by fine sutures over a catheter. It is not to be undertaken until the healing from the last step is complete.

According to the method of Anger, the third step is carried out by forming two flaps the length of which corresponds to the defect to be corrected. One flap has its base along one side of the urethral groove, and the other has its free margin along the opposite side of the groove. The flap with the base next to the groove is turned over the catheter and the free margin united to the base of the second flap by means of sutures armed with a needle on either end. The second flap is then drawn over the first and united to the skin-incision on the opposite side.

In some cases it will be found advisable to make use of the redundant prepuce. For this purpose an incision is made through both layers on the dorsum corresponding with the corona. The glans is slipped through this incision, and the mucous membrane separated from the cutaneous surface from the incision toward the free border, and the raw surface thus formed made to

cover over that which resulted from turning flaps over a catheter to form a new urethra.

Literature of '97-'98-'99.

Case of peno-scrotal hypospadias in which Nové-Josserand's operation was used. The glans was imperforate; the urethra opened on the inferior aspect of the penis, at the junction of the latter with the scrotum. The glans being put on the stretch, a long, narrow bistoury was pushed into its centre, in the situation of the dimple where the urethra should have opened; the knife was made to traverse the whole length of the penis, approximately in the line of the septum between the corpora cavernosa, and was made to emerge at the fistulous opening at the root of the organ; a tunnel was thus made in the position of the urethra. The knife was then withdrawn, and the bleeding was arrested by pressure with the fingers. Meanwhile a Thiersch graft was cut from the inner surface of the left upper arm, ten centimetres in length and two centimetres in width; the graft was then wrapped around an oiled bougie, with its raw surface exposed and fastened to the bougie by a catgut thread at either end. The bleeding from the wound in the penis having ceased, the bougie enveloped by the graft was inserted into the tunnel already made, so that one end projected from the opening in the glans and the other from the fistula at the root of the penis; the excess of bougie was cut off with scissors, the catgut thread at the anterior end of the graft was divided, and the circular edge of the tubular graft was stitched to the edges of the wound in the glans; *i.e.*, the site of the future meatus. A catheter was secured in the bladder and emerged at the fistula at the peno-scrotal junction, and through it all the urine escaped. On the third day the bougie was carefully withdrawn by the meatus, after cutting the catgut thread round the graft at its posterior end; the catheter was allowed to remain until the seventh day; thereafter the patient urinated by the fistula. On the tenth day the new urethra was dilated with bougies Nos. 15 and 16 (French scale); this was repeated

every second day until a No. 19 was easily passed. At a later period the fistulous opening was closed by a plastic operation, and the patient then urinated by the meatus in the natural way. On separating the lips of the meatus, one could see the white epidermis lining the canal of the urethra. Tuffier (Ann. d. Mal. d. Org. Gen.-Urin., Apr., '99).

J. WILLIAM WHITE,

ALFRED C. WOOD,
Philadelphia.

URTICARIA (HIVES; NETTLE-RASH).

Definition.—A symptomatic disorder of the skin characterized by the sudden appearance of pinkish, hard, puffy swellings, or wheals, usually pinkish-white, but varying greatly in color and shape.

Symptoms.—The wheals are invariably accompanied by local heat, marked pruritus, and formication, and disappear early. Its fugitive character is pathognomonic. The size and form of the wheals vary greatly, and successive crops may appear in various parts of the body. They may vary from the size of a ten-cent piece to that of a silver dollar. In typical cases they are round or oval or appear as streaks or irregular patches. The intensity of the subjective symptoms does not always correspond to the degree of eruption, and these may continue quite awhile after the disappearance of the skin-lesion. Again, the symptoms may be irregular, the itching preponderating at times, the burning at others, etc. The rash may appear at one spot, disappear, then suddenly appear all over the body; again, it may develop slowly. The mucous membrane of the mouth, pharynx, larynx, œsophagus, and vulva may be involved. In the larynx œdema may ensue and cause dangerous symptoms.

Literature of '97-'98-'99.

Case of pharyngeal urticaria seen in a young lady, in whom sudden severe dyspnœa occurred while attempting to sing. In about ten minutes the eruption or urticarial wheals were noticed on the skin. A spray of antipyrine and cocaine to the throat gave immediate relief. J. M. Taylor (Phila. Med. Jour., Apr. 2, '98).

General malaise, pain in the legs, and fever have been observed in some cases. The scratching and rubbing to which the patient resorts greatly aggravate the symptoms and cause fresh wheals to appear. The duration of urticaria varies from a few hours to a few days; periods of remission are usual. The eruption, as a rule, leaves no trace, though slight œdema may persist for a few hours.

Besides the ordinary form just described, there are three varieties of urticaria: (a) acute febrile urticaria; (b) urticaria patulosa; (c) urticaria pigmentosa. *Acute febrile urticaria* is rarely met with. It appears suddenly; the eruption is red and attended by much swelling. The trunk, face, and limbs are the areas of predilection. It often develops in the mouth and throat and tends to cause dangerous laryngeal œdema. It greatly resembles scarlet fever. *Urticaria papulosa* is generally observed in children. It usually lasts a long time, even years, and is attended by remissions. The wheals are mixed with papules, and the itching and local irritation is exceedingly marked, especially at night. *Urticaria pigmentosa* differs from the other forms in being attended with a buff-colored pigmentation of the skin, patches resembling those observed in measles, or persistent tubercle-like prominences. Yellow patches persist after the active symptoms disappear. The itching, burning, etc., are only marked after scratching. It is early observed.

Etiology.—Urticaria is due, in most instances, to the ingestion of shell-fish, especially lobster, crab, clams, mussels, oysters, etc., but it may also be caused by ordinary articles of food—fish, pork, various fruits, especially strawberries, raspberries, and peaches—which irritate the gastro-intestinal tract and give rise to the rash through reflex action. Intestinal parasites often give rise to urticaria in children from this. Another class of cases is ascribable to the stings and bites of venomous insects, fleas, mosquitoes, etc., or the irritating substances derived from jelly-fish, the Portuguese man-of-war so common in our Northern waters, caterpillars, and ants, and various dyes. The sting of nettle-hairs may also be included in this category. Many drugs—especially copaiba, cubebs, turpentine, quinine, and capsicum—may give rise to urticaria in persons that are unusually susceptible to their effects. It often attends other skin disorders, especially scabies, pityriasis, and eczema, mainly as a result of the scratching which intense pruritus renders practically unavoidable. Disorders of the genital tract, pregnancy, amenorrhœa, and constipation are frequent causes. Indeed, urticaria may occur as a symptom of almost any affection to which the human organism is liable. The rheumatic and gouty diathesis seem to predispose to it, or at least to be very closely associated with the appearance of urticarial wheals, or pomphi.

Pathology.—The development of a wheal is a process determined by a reflex mechanism set in motion by two sets of stimuli. Here, as elsewhere, the mechanism must consist of afferent nerves, a centre, and efferent nerves, the centre being located in the plexus of fine fibres ramified through the superficial layers of the corium. The stimuli which awaken

the activity of this system are direct or indirect; they are external irritants applied directly to the surface of the skin,—*e.g.*, changes of temperature, nettles,—or they arise from the ingestion of certain substances endowed with toxic properties (Stephen Mackenzie). The wheal is a circumscribed swelling of the skin, attended with engorgement of the vascular supply and an exudation of serum into the cellular tissue around the vessels. The proximity to the absorbent vessels accounts for the early disappearance of the wheals. In the papular form the papules are ascribed to urticarial exudation into the cuticular structures. Unna attributes the wheal to spasm of the venules whose functions are to carry off the lymph.

Treatment.—Urticaria being purely a symptomatic disorder, treatment should aim to correct the primary etiological factor. But a few of these have been enumerated even in the long list given under ETIOLOGY: a statement emphasizing the need of careful inquiry into each case. The environments of the patient, his underwear, should be submitted to close scrutiny; the state of his digestive, reproductive, and urinary organs should be inquired into; and the class and quality of his food investigated. Diathetic disorders—such as rheumatism and gout—demand special attention. As to the internal measures indicated for the eruption, atropine is considered valuable by Besnier; strophanthus hispidus by Rifat, who gives 10 to 20 drops daily; while iodide of potassium, arsenic, and quinine have also given excellent results in some cases.

Literature of '97-'98-'99.

The following mixture is highly recommended as a local application for urticaria:—

- R Alcohol,
 Chloroform, of each, 3 parts.
 Sulphuric ether,
 Menthol, of each, 1 part.

M. To be applied in the form of spray. Gaucher (N. Y. Med. Jour., Apr. 9, '98).

Urticaria, produced by toxic foods, shell-fish, etc., is best met by lavage of the stomach or an emetic. A cup of lukewarm water is often sufficient for the latter purpose. A saline purgative should follow. In neurotic and arthritic cases sodium bicarbonate is often efficacious, especially, according to Cerilly, if given per rectum. The injection should contain, for an adult, 5 drachms of the bicarbonate of sodium, 30 drops of the wine of opium, and 1 pint of boiled water. These are repeated several times a day.

B. Wolff (Amer. Medico-Surg. Bull., May 25, '98) relieves the most acute symptoms of urticaria within a few hours, and effects a cure within twenty-four hours, by giving sodium phosphate in doses of 4 to 5 grains every three hours, in concentrated solution.

The following solution may be used topically:—

- R Prepared calamin, 45 grains.
 Zinc oxide, 45 grains.
 Carbolic acid, 15 grains.
 Lime-water, 1 ounce.
 Rose-water, 2 ounces.—M.

Bulkley (Med. Rev. of Rev., June 25, '98) recommends the following application as a calnative:—

- R Chloral,
 Camphor, of each, 1 drachm.
 Pulv. starch, $\frac{1}{2}$ ounce.

M. Sig.: Keep tightly corked in a wide-mouthed bottle. Rub in with the hand.

UTERINE ADNEXA, DISEASES OF.

Malformations of the Ovaries and Tubes.

Malformations of the ovary and tube may be congenital or acquired. Both ovaries may be congenitally absent. This malformation is generally associated with defective development of the uterus. An individual so affected does not experience the physical changes in conformation incident to puberty, and more resembles the male. If one ovary is absent, the corresponding half of the uterus and tube will probably be deficient in development. The corresponding kidney has also been found absent. A third or accessory ovary is very infrequent. Constricted portions of the ovary have been mistaken for supernumerary ovaries. Small islands of ovarian tissue have been found upon the peritoneum. Such conditions, or an incomplete removal of an ovary, are undoubtedly the causes of menstruation subsequent to oöphorectomy. With absent or partially developed ovaries the sexual functions are never performed normally. The absence of one ovary or its destruction by disease constitutes no obstacle to either sexual intercourse or conception. It is very important to determine the absence or existence of rudimentary ovaries, as, when once recognized, the futility of measures to establish menstruation is demonstrated.

Defective development in the tubes consists generally in defective development of the fimbriæ at their abdominal ends. The tube may be unusually short or well developed on one side and rudimentary upon the other. The most frequent alteration is in the supernumerary ostia, or openings of the tube. These may be mere apertures or surrounded by fimbriæ. A defective development may result in an unusually convoluted

tube. These convolutions may be so marked as to form strictures which contract the cavity sufficiently to render the woman sterile. In failure of the ovary to descend, the tube may be drawn out at the higher level.

Acquired Malformations of the Ovaries and Tubes.

The acquired malformations of the ovary and tube are frequently produced by disturbances in the circulation. They result in hyperæmia, or congestion, of the ovary. This occurs physiologically during ovulation and coition. It is not infrequent at the establishment of the menstrual function, especially in those individuals in whom the mental faculties have been developed at the expense of the physical structure.

Marked congestion may result in extravasation of blood into the follicles and stroma of the ovary, more frequently in the former. Such a hæmorrhage may lead to the follicles being distended to the size of a hen's egg or even that of an orange. This is later converted into a pigment of the consistence of honey, with a chocolate color. Such conditions have also been associated with heart disease, typhoid fever, phosphorus poisoning, and in excessive burns. Follicular apoplexy, as well as ovarian congestion, mostly occurs in the sexually immature. Such a collection may be absorbed, or the distension become so great as to cause rupture of the ovary and a large hæmorrhage into the peritoneal cavity. Occasionally a fatal peritonitis may follow.

The tube may undergo alterations in form and situation, while the presence of abdominal tumors, especially ovarian tumors, stretch the tube out, causing it sometimes to attain two or three times its normal length. The tube may become congested from being twisted with

the pedicle of a cyst. Moderate congestion results simply in the distension of the tube; more marked interference with the circulation will result in the rupture of small vessels and extravasation of blood into the tube and the surrounding parts. If still more marked, may lead to necrosis of the tube with the tumor. Congestion of the ovary and the tube is characterized by pain in the lateral region of the pelvis preceding the menstrual flow by a week or ten days. With the establishment of the flow the engorgement will be relieved, the pain ceases, and many patients experience greater comfort during the menstrual period. The flow is generally prolonged and excessive, not infrequently amounts to hæmorrhage. The patient is weak, pale, and anæmic.

Diagnosis.—Such a condition should be suspected as the cause of excessive and prolonged menstrual flow near puberty, when the appearance of the patient is characterized by anæmia, complains of weakness, pain, and tenderness within the pelvis, more marked upon the left side, not infrequently associated with pain in the corresponding mammary gland. Follicular apoplexy presents no distinctive symptoms, and is rarely recognized.

Treatment.—The subsequent progress of the patient will depend upon the hygienic management. The patient should be taken away from school, denied the study of music and the reading of emotional literature. She should be encouraged to take out-door exercise, especially horseback- and bicycle-riding and walking. City girls should be sent to the country and sea-shore. The action of the bowels should be carefully supervised and a generous diet given, from which pastries and sweets must be largely excluded. A morning sponge-

bath followed by friction with a coarse towel is advisable. During and a few days preceding the menstrual period the patient should be confined to bed. If the flow is generally excessive the period should be preceded for a few days by the administration of extract of ergot, f5ss, or ergotin, gr. ij in capsule, or a tablet triturate of hydrastinin, gr. $\frac{1}{8}$ to $\frac{1}{4}$ three times a day; while during the menstrual intervals potassium bromide, gr. xv, should be administered three times daily. Tonics—such as quinine, strychnine, or the bitter tinctures—are serviceable. The anæmia may tempt one to resort to the use of iron, but this remedy is better postponed until hæmorrhagic symptoms are under control.

Displacements of the Ovary and Tube.

Hernia through the inguinal canal is a rare condition. It is generally found upon the left side. Crural hernia is more frequent, but the ovary has also made its exit through the greater sacro-sciatic foramen and the umbilicus. Chenieux reported an ovarian cyst in the right buttock. Most probably the first surgical removal of the ovaries was performed by Potts for ovarian hernia. The hernia of the ovary is generally secondary, and results from adhesions to the omentum or the intestine. The displaced organs may readily be mistaken for glands or labial tumors. The constant presence of such a tumor; the dull, sickening pain; extreme nausea; and great tenderness should afford a suspicion as to the diagnosis.

Treatment.—Taxis should be judiciously and carefully exercised. An ice- or sand- bag should be applied, and, when the reduction has been accomplished, a truss should be worn. If the hernia is irreducible, the sac should be opened and the ovary replaced or removed.

Prolapse of the ovary and tube are generally dependent upon the position of the uterus. With a retroflexed or retroverted uterus, the ovary is no longer supported upon the broad ligament, but hangs from it, and generally lies beneath the uterus in Douglas's *cul-de-sac*. The ovary may be displaced while the uterus retains its normal situation. This more frequently occurs with the left. It is characterized by tenderness, and pain during coition and defecation. Pain during the former may be so great as to preclude its performance. The condition is recognized by vaginal and rectal palpation, in which a movable mass is found which can be displaced upward or whose pedicle can be appreciated. The tumor is exceedingly sensitive, and pressure upon it causes a sickening sensation. When the condition is complicated by inflammation, the ovaries and tubes may be found fixed behind the uterus.

Treatment consists of rest, regulation of the bowels, prohibition of the marital relation, and persistent efforts on the part of the patient in the genu-pectoral position to permit the heavy organ to fall out of the pelvis. When the organ is raised up it may be maintained in place by a suitable pessary. Pessaries with heavy posterior bar are most satisfactory, as they fill up the posterior *cul-de-sac* and afford less opportunity for the downward displacement of the ovary. When various pessaries have been unsuccessfully tried, if the patient is incapacitated for her duties, an abdominal section should be performed and ovarian fixation effected by restoration of the infundibulo-pelvic ligaments or suturing the pedicle of the ovary to the anterior parietes at a point corresponding to the exit of the round ligaments. Descent of the ovary alone does not justify extirpation.

Prolapse of the ovary and tube are very common, where these organs have become considerably enlarged; so that it is not unusual to find tubal and ovarian enlargements behind the uterus.

Inflammations of the Ovary.

Oöphoritis.—Inflammation of the ovary is known as oöphoritis and periöphoritis. It may be either acute or chronic. We find distinctions of parenchymatous, follicular, and interstitial inflammation, but such conditions are not recognized clinically.

Acute Oöphoritis.—**SYMPTOMS AND ETIOLOGY.**—The patient complains of intense lancinating pain, generally in the left inguinal region, with marked tenderness, elevated temperature, rapid pulse, and frequent chills. In periöphoritis symptoms are less marked than in mild peritonitis.

Acute inflammation is generally caused by injury, septic poisoning after parturition or abortion, gonorrhœa, arsenic or phosphorus poisoning, or the exanthemata, acute rheumatism, mumps, and long-continued endometritis. The most frequent cause is sepsis, next gonorrhœa. Sepsis is prone to result in abscess. Gonorrhœa produces periöphoritis, with fixation of the ovary.

Acute inflammation may terminate in resolution and disappearance of abnormal symptoms, or in the development of an abscess, its rupture, the occurrence of rapidly fatal infective peritonitis; or the disease may become chronic; most frequently is associated with disease of the tube.

PATHOLOGY.—In an acute inflammation of the ovary the organ is enlarged, cedematous, filled with cysts and the latter with cloudy serum resembling pus. It rapidly attains to three or four times its normal size; is filled with serous fluid, and in the more severe grades with pus;

can attain the size of a man's head, but generally is not larger than a hen's egg. When inflammation results in the formation of an abscess, its watery contents can be absorbed, and leave a cheesy mass. In the milder forms resolution occurs. An acute inflammation may be followed by cirrhosis of the ovary from the retraction of the increased connective tissue. The ovary may be reduced to the size of a hazel-nut. This form of inflammation involves both ovaries, while abscess usually involves but one. In periöphoritis the capsule of the ovary becomes thickened, and the entire organ fixed by perimetric bands of adhesion. Thickening of the capsule renders it less likely to rupture when the mature follicle and a cyst remains. A large number of such follicles form a cystic ovary. The partitions between these break down and considerable sized cysts are formed.

TREATMENT.—Absolute rest in bed; free purgation by salines; tincture of aconite, gtt. i-ij every hour; leeches to the perineum; an ice-bag over the seat of the pain; morphine by the rectum or hypodermically, only to control the severe pain.

Chronic Oöphoritis.—Chronic inflammation is much more common than the acute. It occurs during the period of sexual activity and more frequently in the married. If the ovary is large, contains a number of cysts, with increased fibrous tissue, it is followed by an atrophy known as cirrhosis. It may be fixed in the pelvis by an extensive infiltrate, rendering it immovable, and its situation difficult to discover.

SYMPTOMS.—Pain, with its greatest intensity in the groin, and most frequently upon the left side. It is persistent, increased by locomotion, misstep, or jolting, and exaggerated as the menstrual period approaches. With free menstrual

flow the pain is relieved or disappears. When slight, it increases. Pain extends down the thighs over the sacrum; not infrequently it is experienced in one or both mammary glands. Pain in the groin and symptoms of spinal irritation are frequently present during the menstrual periods. Pain, hysteria, and hystero-epilepsy are associated. Sterility is a constant result. The ovaries—tender to pressure—are not much enlarged. When they are prolapsed, the symptoms are increased. Physical examination must be conducted with care. When prolapsed and fixed by inflammatory exudate, a careless observer may mistake it for retroflexion of the uterus.

Diagnosis is determined by finding large sensitive ovaries, increased distress for a week or ten days prior to menstruation, mammary pain, and painful defecation and coition. Rectal examination will be found of service.

ETIOLOGY.—Chronic inflammation is a sequel of the acute and due to the same causes; it is also produced by long-continued congestion from excessive sexual intercourse, masturbation, sexual excitement without gratification, suppressed menstruation, and operations upon the cervix.

TREATMENT consists in the removal of the source of irritation, interruption of marital relations, interdiction of vigorous exercise or long standing, rest in bed during menstruation, extraction of blood by leeches, counter-irritation with iodine or small blisters, and the internal administration of potash salts—iodide, bromide, or chlorate alone or in combination with bitter tonics. Ichthyol is frequently of service, administered by the mouth, by suppository, or on vaginal tampons; fixation of the ovaries may be overcome by judicious pelvic massage; severe attack of pain ameliorated by tincture of pulsa-

tilla, gtt. x, four times daily, or extract of gelsemium, gtt. v, three or four times daily. The faradic current of tension—that is, through a long, fine wire—has been found serviceable in relieving the pain.

Inflammation of the Tubes.

Symptoms.—Tubal disease presents no characteristic symptoms. Patients complain of pain, tenderness, and more or less induration of the pelvis as a result of the inflammation in the peritoneum. The uterus, ovaries, and tubes are fixed, not infrequently in a mass which cannot be differentiated; so that we are unable to definitely determine the position and relation of the uterus to the inflammatory collection. The progress of the inflammatory condition, the interference with the nutrition and action of the intestinal canal, and also the absorption of septic matter bring about a lowered state of vitality and a depraved state of health.

Diagnosis.—The history of the patient and course of the disease would indicate the existence of pelvic lesions. Bimanual examination reveals more or less fixation of the uterus, a mass situated upon one or both sides, or in Douglas's pouch, the contents of the pelvis agglutinated, with a history of pain and tenderness; a recognition of points of softening should enable us to arrive at a diagnosis of pelvic suppuration. In the less severe inflammation, resulting in an hydrosalpinx, we will find upon one or both sides of the pelvis a retort-shaped mass, with its smallest portion directed toward the uterus and the larger extending outward into Douglas's pouch, which is movable and differs from an ovarian cyst in shape, having a retort-, or pear-, shape, rather than spherical. Fluctuation may be indistinct, according to the size of the mass.

Literature of '97-'98-'99.

Prolapsed intestine and varicose veins have caused difficulties in diagnosis of diseases of the Fallopian tubes. If patients are examined in the exaggerated Trendelenburg or exaggerated knee-chest position, the tumor disappears. Placing the patient in either of these positions, a little pressure will raise the intestine sufficiently far up to know that it is not a tube, or it will sometimes slip out of the pelvis of its own accord. If there are many adhesions this will not take place, but the contents of the intestine can be pressed up out of the pelvis, so that the distended canal collapses and shows that it is not a tube. Placing the patient in this knee-chest position or the exaggerated Trendelenburg position, any present disappear, and the differential diagnosis is made in that way. A. J. C. Skene (Brooklyn Med. Jour., Aug., '98).

Etiology.—Tubal disease is most frequently a result of infection, which may follow an abortion or labor, careless examination, or operation upon the cervix or uterine cavity. A more frequent cause is gonorrhœa, which travels through the uterus to the tubes and pelvic peritoneum. Another cause is the tubercular bacillus. This latter disease probably occurs more frequently in the tube than in any other portion of the genital structure. Less frequently it arises as a result of syphilis and actinomycosis. The most frequent cause of hæmatosalpinx is ruptured ectopic gestation with retention of blood in the tube, which subsequently becomes thinned and mixed with mucus. A collection in a tube adherent to an ovary which possibly contains a number of cysts is likely, upon increase in size of the two collections, to have the intervening wall or septum become so thinned as to break down, the two structures become one, and form a tubo-ovarian cyst or tubo-ovarian abscess according to the character of its con-

tents. As the sac enlarges, its mucous membrane becomes smooth, and the wall gradually thinned until it forms a tumor of considerable size. The sac, as it increases in size, may drop into the pelvis, fill up Douglas's pouch, and rupture, or the escape of pus-contents, infecting this portion of the peritoneum, may produce a localized peritonitis and the formation of a large collection in the *cul-de-sac*. Occasionally two infected tubes may drop down into Douglas's cavity, their ends become united, and a large double pyosalpinx form, the sac consisting of the two dilated tubes.

Pathology.—Inflammation of the tubes occurs in the form of acute and chronic inflammation. Chronic inflammation results in salpingitis, perisalpingitis, accumulation of fluid in the tube forming an hydrosalpinx, pyosalpinx, or hæmatosalpinx, according to the activity of the inflammation and infectious character of the germs. Inflammation consists in, first, thickening of the mucous membrane, frequently desquamation of its epithelium, and enlargement of the tube. The longitudinal folds of mucous membrane, becoming abraded and lying in apposition, infrequently become adherent, forming what appear to be cysts. At other points, particularly in the isthmus of the tube, thickening of the membrane occurs, forming pea- to bean- sized nodules, which are spherical in form, with sharp margins, and give the impression of tumor-formations. They are firm in consistence, thick, vascular structures, sometimes also double sided, and symmetrical. This inflammation has been denominated the salpingitis nodosa isthmica. With the extension of the inflammation to the mucous membrane, increased secretion follows, portions of which are discharged into the peritoneal cavity, and cause an inflammatory con-

dition, which causes the plastic material to be thrown out, and close up the end of the tube. With inflammation and thickening of the mucous membrane, it becomes contracted and leads to retraction of the fimbriae, or by the contraction of the muscular layer it pushes the peritoneum over the abdominal orifice, which becomes agglutinated and closes the opening. Occasionally one or more fimbriae may protrude, thus leaving a track by which fluid subsequently may escape into the peritoneal cavity. With the closure of the tube the increase of contents causes an obtuse-ended tumor, which gradually fills with fluid, forming occasionally a pear-shaped mass, or, where its walls are in places constricted by an increased amount of fibrous tissue, a sausage-shaped tumor is formed. This sac, when its contents are serous, is an hydrosalpinx, and occasionally becomes greatly distended, forming a sac as large as a child's head, which increases in size toward the abdominal end, and presents a thin-walled tumor which is more or less free, and about which adhesions may be entirely absent. In a more acute infection the contents become purulent, and with pus-contents we have an inflammation extending through the wall of the tumor, involving its peritoneal surface, and not infrequently causing extensive peritoneal inflammation by which everything in the pelvis is matted together. Such a sac may subsequently rupture, spread out the broad ligament, and form a pelvic abscess of considerable dimensions. If the adhesions are firm between the intestine or bladder and sac, rupture may occur either in the intestine or bladder and decrease the tumor from the discharge of pus; or the wall may become so thinned as to permit its discharge through the abdominal walls, into the vagina, or more seriously into the peri-

toneal cavity, when it is followed by rapidly fatal septic peritonitis. When the sac empties into the bladder or intestine, it does so at a level which does not permit the entire sac to be drained, and consequently it is only the overflow that escapes. The patient is subjected to a long-continued drain, which results in increased anemia and debility.

Treatment. — Palliative treatment in these conditions is of no avail. If the patient is in an acute attack one may prefer to bring about a subsidence from the acute symptoms. Place the patient in bed, administer purgatives, and apply an ice-bag. No hope for permanent relief can be asserted until the sac is evacuated or removed. The method of treatment, however, will depend somewhat upon its situation and size. A large collection filling up Douglas's pouch, or distinctly recognized through the vagina, is preferably attacked by vaginal incision, in order to remove the large quantity of infectious material without bringing it in contact with the peritoneal cavity. Collections of pus may be evacuated by free vaginal incision, through the posterior vaginal fornix; expose the sac and make an incision into it through which its contents are evacuated. The sac is thoroughly irrigated, and an examination made as to the existence of further collections. If any exist, they are broken open and evacuated. Where the sac is readily separable it may be gradually drawn down and removed through the vagina. If, however, there is more or less fixation of the thoroughly opened and irrigated sac, it is packed with iodoform gauze, which is permitted to remain the greater part of the week, the cavity being irrigated, after its removal, with formalin solution (1 to 2000) and re-packed. The procedure should be continued every few days until the sac has

contracted, when it may be omitted. Occasionally this operation will result in obliteration of the sac and cure of the patient. It should always precede an abdominal section whenever there is a large collection of pus that can be reached *per vaginam*. The only objection to the plan of treatment is that it is not always curative; the secreting surface remains and the sac may again close and refill. The effective operation is to open the abdomen, break up the adhesions, and remove the infected tube and ovary. This operation is greatly enhanced by placing the patient in the Trendelenburg posture, by which the sight as well as touch may be exercised in the enucleation and removal of the mass.

In order to remove pus-tubes without rupture, the following technique may be adopted: Clamps are placed upon one of the tubes, closely hugging the uterus and embracing one inch of the broad ligament. The ovarian artery is tied or clamped as near the pelvic wall as possible and a ligature is placed on each severed end, or it may be placed before section, and the incision made between the points. No bleeding can take place, and the surgeon can leisurely enucleate the tube and ovary with its contents. When an infected stump is left an excision of the cornua is demanded. The ovaro-uterine artery is ligated, the forceps removed, and another deeper ligature taken if necessary. The Trendelenburg position is most desirable. Flushing or drainage of the cavity is unnecessary. J. S. Stone (Med. Rec., May 16, '96).

While extirpation of a tubal sac is the proper treatment in large collections, whether of blood, pus, or serum, abdominal section should not be considered as required in every case of tubal inflammation. In the slighter forms of disease, and in the early stages, the hygienic measures already indicated, supplemented by palliative curettement and the drainage of the uterus, will often be sufficient to establish a resolution of the slighter

forms. The maintenance of uterine drainage will often be sufficient to establish a cure, both clinically and functionally. In other words, patients who have had extensive tubal inflammation of gonorrhœal origin have recovered and subsequently given birth to children. I have observed this sufficiently frequently in my own practice to make this assertion without question. Occasionally the uterine end of the tube remains patulous, permitting, in certain positions of the body or in overaccumulation, the evacuation of the sac through the uterus and its disappearance until it again refills. This condition is known as hydrops tubæ profluens.

The extension of inflammation from the uterus to the tubes and the existence of inflammatory products in that organ after the removal of the tubes, which not infrequently causes nervous and other manifestations, led Péan and his followers to advocate the removal of the uterus *per vaginam* whenever the condition was such as to require the removal of both ovaries. This operation may be done either by clamp or ligature. The clamp operation is the more expeditious. The ligature, while longer, is safer.

The operative procedure consists, first, in thorough cleansing and disinfection of the vagina. The cervix is seized with a double tenaculum, and the vagina incised with scissors, knife, or—preferably—with a thermocautery-knife. Incision with the latter prevents hæmorrhage from the vaginal wall and promotes drainage through the longer duration required in the union of the vaginal wound. The incision completely encircles the neck of the uterus and may extend one-half to three-fourths of an inch on a line posteriorly to the broad ligament. Pus-collections in either the tube or Douglas's pouch should now be opened and thor-

oughly evacuated, and the cavity irrigated before the adhesions are broken up, which removes an extensive source of infection.

The separation of the bladder from the uterus is accomplished by blunt dissection and the tissues are pushed off posteriorly in the same manner until the peritoneum is reached. By the dissection, we may frequently strip out a good portion of the cervix without the necessity for ligating vessels. Having reached the peritoneum in front and behind, a fold of the broad ligament is then secured on either side by ligature or a clamp, and incised, which sets free the cervix. We may now proceed to drag down the cervix, ligate and cut the remaining portions of the broad ligaments on each side in a similar manner, or the cervix may be amputated and the fundus of the uterus rotated downward through the anterior incision. This procedure permits the passage of the finger over the fundus, to follow up the broad ligaments, and accomplish the enucleation of the ovary and tube. The ovary and tube are usually prolapsed backward from their weight, and this manœuvre renders them tense and enables the operator with the finger to follow more readily the line of cleavage between the tube and ovary and the other tissues.

After the sac is separated and enucleated, the remaining portion of the ligament is ligated and cut. This is usually first done upon the left side, which gives us more room to follow the same procedure upon the right. If ligatures are used they should be firmly tied, and the ends cut to prevent traction, which may pull them from the stump. A retracted stump is quite difficult to reach, and in dragging it down the ovarian artery may slip back and bleed. The stumps are temporarily held with clamps,

so that they may not be retracted beyond our reach when we choose to close the vaginal wound.

With the completion of the operation the surfaces are carefully inspected for bleeding-points, the vagina and the pelvis irrigated with a normal salt solution, by which the blood and discharge are completely removed. In the majority of these cases extensive tearing and denudation has been necessary, which will result in the escape of the serous effusion or even blood; it is preferable not to close the vaginal wound, but pack the cavity with iodoform gauze. This gauze packing is permitted to remain from six to eight days. When removed, plastic exudation, which has been thrown out around it, will hold up the intestines and prevent their prolapsus. The tampon, however, should be replaced by a smaller one, which is permitted to remain for a few days. The sutures may be silk or catgut, preferably the latter, as the silk is almost certain to become infected, and will prove a source of irritation until they are finally thrown off or disintegrate. The catgut is of much shorter duration and much less likely to cause trouble.

The vaginal operation is not applicable to all cases. It should not be preferred when there is any hope of saving the uterus and the appendages of one side. It is only in those cases in which the examination has demonstrated the necessity for the sacrifice of both ovaries and tubes, that the extirpation of the uterus should be considered. Where a partial operation is done, the preferable route will be by the abdomen, as it permits us the better to inspect the condition of the peritoneal cavity, to break up adhesions, and suitably treat the partially diseased organ, which may remain.

Tumors of the Fallopian Tubes.

Benign Growths. — Tumors of the

tubes and ovaries may be benign or malignant. The benign tumors of the Fallopian tubes are exceedingly rare, excepting those which are the products of inflammatory changes, and have already been given.

Fibroma, or myoma, of the tube is an infrequent growth, and attains to small size. It arises from the muscular tissue of the tube, and may grow inward or become subperitoneal; it rarely obstructs the calibre of the tube. Inflammatory and tuberculous changes have sometimes been mistaken for this growth, particularly the condition known as salpingitis nodosa.

Recklinghausen has described a form of fibroma characterized by fibroid constituents and including glandular structure. This growth is attributed to some remains of the primordial structure. The *fibrocyst* of the tube is so rare that but a single case has been described, that of Sanger-Barth, which consists of three tumors, the conglomeration of various large cysts, firm tumors that were in part pedunculated from the fimbriæ of an otherwise healthy tube. Under examination the products greatly resemble a teratoma. *Enchondromata* are small cartilaginous masses found in the ends of the fimbria.

Dermoid cyst of the tube is exceedingly rare. Ritchie described one which contained a plum-sized bone. Pozzi has also described a dermoid cyst removed from the tubal wall. Cysts of small size are frequent. The large irregular bullæ so common in association with fibroid growths are said to be dilated lymph-spaces. Cysts which vary in size from a pea to a walnut are found in the walls of the tube, but most frequently beneath the peritoneum. Cysts within the tube are generally the result of adhesions of adjoining folds of the mucous membrane.

Polypus is a rarely recognized growth. Lewers reports a case in which the inner surface of the tube was studded with such growths varying in size from a pin's head to a pea. *Papillomata* of the tube, considered as adenoma by Sutton, are allied to the condylomata, or warts, of the vulva; they consist mainly of epithelium. These growths are difficult to differentiate from sarcoma and cancer, but are evidently benign.

Malignant Growths. — *Carcinoma* of the tube may be either primary or secondary, though the latter is much the more frequent. The secondary involvement may take place from either the ovaries or the uterus. Doran divides primary cancer of the tube into two forms: where the cancer first develops in mucous membrane of a normally-formed tube; second, where it forms in a malformed tube, bearing a cyst whose wall becomes infected.

Where gonorrhœal affections of tube are excluded, the diseases to be thought of are sacculated growths, tuberculosis, carcinoma, or abnormal pregnancies. The diagnosis of carcinoma is made more easy than others in that a fluid (increasing in amount) is capsulated by a ridged wall; sometimes also there is a vaginal discharge of bloody water or cloudy mucus.

Wagner states that in northern Germany 5 per cent. of uterine carcinoma are associated with carcinoma of the tube, while Kiwisch, in southern Germany, found the tube carcinomatous twenty-five times with 100 uterine carcinomas. It very rarely occurs with carcinoma of the cervix, is more frequent with ovarian carcinoma, and most frequent with carcinoma of the uterine body. Primary tubal carcinoma may infect either the uterus or peritoneum. Primary tubal carcinoma is most frequently bilateral. Eighteen cases have been reported. The form of carcinoma, according to Sanger, is always medullary; sometimes infiltrating, sometimes

villous. The climacteric and catarrhal inflammations are predisposing causes (Sänger). The character of growth is either progressive thickening with increased consistency, at least in the beginning; soft nodules or irregular nodules, of medium consistency, growing to the side or even behind the uterus. Diagnosis *per vaginam* must be made by exclusion, rectal and bimanual examination under ether. Cachexia is not present, at least not early. The presence of ascites, disease of neighboring organs, stomacic, urinary, and rectal symptoms are important. When the growth breaks through into the peritoneal cavity marked symptoms result. Appearance of the posterior wall of the bladder is often important. In six cases the diseased organ has been removed and the patient provisionally restored. In four cases the disease returned. Doran advises the removal of uterus and both tubes. Four died either during or immediately after operation. In the case in which the growth was least advanced the uterus and tubes were removed *per vaginam*. The left tube showed beginning villous cancer. Hennig (Centralbl. f. Gynäk., No. 47, '96).

Literature of '97-'98-'99.

All the published cases of primary carcinoma of the Fallopian tube—23 in number—collected, in 20 of which carcinoma developed in a tube which presented no other evidences of disease. In three cases the disease probably extended to the ostium from an adherent ovarian cyst that had undergone malignant degeneration. One patient was free from recurrence seven years after operation, four being alive from one to one and one-half years after, while all the rest died within a year after extirpation of the affected tube. Doran (Trans. London Obstet. Soc., '98).

Sarcoma of the ovary is frequent; of the tube very rare. Sarcomatous nodules are sometimes found scattered over the peritoneal surface of the tube, but it more frequently passes from the ovary to the omentum. Deciduoma malignum

can occur in a portion of the placenta or chorion of the tube. It forms in the tubal sac as readily as it would in the placenta or chorion of the uterus. The possibility of such an occurrence is urged by Sänger as an additional argument for active interference for the extirpation of tubal moles and the appendages after tubal abortion.

Tumors of the Ovaries.

These tumors differ from the other neoplasms in their greater propensity to malignant degeneration, often rendering it difficult to determine whether the individual growth is malignant or benign; consequently we will discuss the two classes of tumors together.

Classification.—Tumors of the ovary are divided clinically into *cystic* and *solid*; pathologically into *simple*, *proliferating*, *dermoid*, and *parovarian*. By size, into small and large. The cystic comprise the simple, proliferating, and the dermoid. Solid tumors, less frequent, are the fibromata, sarcomata, and carcinomata. Cysts may originate in any part of the tubo-ovarian structure, as the cortical, medullary, and parenchymatous portions of the ovary, and in the structure between the tube and ovary known as the Rosenmüller organ, or parovarian structure, of which the hydatid of Morgagni, the extremity of the canal of Müller, is an example. Cysts which develop in the folds of the broad ligament are known as broad-ligament cysts.

Cysts.—Cystic growths attain almost unlimited size, larger than any other growth, and occasionally the body seems but an appendage to the tumor. They rapidly reach the weight of one hundred pounds. Maritan recently reported an ovarian cyst weighing two hundred pounds, removed from a woman who had previously weighed two hundred and ninety pounds. Her girth measure was

ninety inches. Solid tumors closely retain the shape of the ovary; cystic are irregularly spherical,—the larger they become, the more spherical. The surface of the cyst is a bluish white, greenish, brownish, yellow, or a glistening white. Secondary developments in the cyst-wall may give it an irregular shape. Cysts are still further divided into unilocular, or single cysts, and multilocular, where the cysts are divided into a number of cavities or smaller cysts within its walls.

The contents of the various tumors greatly differ. Indeed, the different cysts in the same tumors show radically different contents. In the unilocular tumors the contents are usually clear and limpid; in the multilocular, thick, viscid, and glue-like. In some chambers it may be clear and limpid, in others thick and viscid, or, again, mixed with pus, blood, or fat. Cysts of the broad ligament are generally unilocular and contain clear fluid. Those which originate in the hilum are papillary, and those from the parenchymatous structure of the ovary glandular. The small cysts are described as: first, small residual cysts which develop from the horizontal canals of the parovarium, with which may be included the hydatid of Morgagni; second, follicular cysts; third, cysts of the corpus luteum; fourth, tubo-ovarian cysts.

The large cysts are: first, the glandular proliferous; second, the papillary proliferous; third, the dermoid, simple and mixed; fourth, parovarian, including several varieties, as hyaline, papillary, and dermoid.

Small residual cysts develop in the structure between the tube and ovary, known as the parovarian structure, or organ of Rosenmüller. Those originating in the vertical tubes have ciliated epithelium, and may subsequently de-

velop into papillary growths. They are detached from the ligament and hang from the peritoneal surface by a slender pedicle. Attached to the fimbriated end of the tube is generally found a small cyst varying in size from a pea to a cherry, known as the hydatid of Morgagni, which from its almost constant presence is regarded as a physiological cyst.

Follicular cysts, or hydrops folliculorum, are small cysts which are unilocular, dilated follicles, generally multiple and small. In an ovary which has not attained twice its size, fifteen or twenty of these cysts are often found. They were long considered as the sole source of large ovarian cysts, but it is in rare instances only when they attain the size of a fist, occasionally that of a man's head. The contents of the cyst are generally clear, may be blood-stained, and have a specific gravity of 1005 to 1020. The cyst-wall is a transparent, thin membrane of light-gray color, covered with columnar epithelium. The ovarian stroma may be excessive or the reverse. In the latter condition the ovary is frequently converted into a mass of delicate cysts. The disease is generally bilateral. These cysts are unruptured and dilated Graafian follicles. In the smaller ones ovuli may be detected. Failure to rupture and increase of fluid contents increase the atrophy of the follicle. Rupture may be prevented by undue thickness, or toughness, of the ovarian wall, which results from inflammation, or deposits of exudation upon the surface of the ovary. It also is caused by a deep situation of the developing follicle, or a very slight congestion, insufficient to furnish proper secretion to produce rupture. These cysts have been found in an ovary prior to menstruation; indeed, in the foetal ovary. They rarely give rise to symptoms.

Literature of '97-'98-'99.

The cystic ovary is very excessively painful to the touch, either through the vagina or rectum, while in varices of the plexus the ovary is not so painful or not painful at all.

The pain is usually much worse as the menstrual period approaches, and remains severest in cystic ovaries during the time of flow. Not so, however, with those in whom a varicose condition of the venous plexus exists. They usually suffer most during the inter-menstrual periods, their period of rest being after the flow has been fully established. George Halley (*Jour. Amer. Med. Assoc.*, Apr. 29, '99).

Cysts of the corpus luteum are unilocular cysts the size of a pigeon's egg, occasionally that of an apple. They were described by Rokitansky, and it was supposed they could only occur in the corpus luteum of pregnancy, but they have been found in the nullipara.

Tubo-ovarian cysts arise from contact with the distended tube adherent to a cyst of the ovary. The increasing pressure of the accumulating fluid gradually absorbs the thin septum, and the two sacs form one cavity, the smaller portion of which is usually formed by the tube. The uterine end of the tube can remain permeable and, as the fluid increases, permit the overflow to drain through the uterus. Such a condition is known as a profluent tubo-ovarian hydrops, which resembles ovarian hydrops tubæ profluens. The open tube acts as a safety-valve and prevents increase from distension of the cyst.

Large Cysts. — Proliferating cysts comprise the great majority of ovarian tumors and vary in size from an egg to that of a tumor weighing over one hundred pounds, which fills up the abdomen and encroaches upon the thoracic viscera. The surface of the cyst presents a pearly-white, glistening appearance, the

thinner portions of which are purple, green, or black, according to the color of their individual contents. The external surface may be smooth or covered with papillary growths or mucous vegetations. The glandular proliferous are highly organized and richly supplied with blood-vessels. The glandular proliferous have the faculty of budding or generating new cysts from within the original growth. They may be spherical in shape and regular in outline, simulating a single cyst, or be irregular from numerous nodules, which indicate a multilocular tumor. These growths generally have a distinct pedicle, which is the attachment of the tumor. The pedicle may be long or short, thin and band-like or broad and thick. Occasionally the tumor is sessile. The latter are frequently intraligamentary. The pedicle is developed by the traction of the tumor and the resulting hyperplasia of the ovarian ligament and stretching of the meso-ovarium. The tube generally remains separated by its mesosalpinx from the tumor, while the ampulla is often fastened to or approaches the sac. The tube is usually elongated. In ovariectomy the tube is generally removed with the pedicle. The pedicle varies in length from four to twenty centimetres; in breadth, from two to twelve centimetres, and may be entirely absent. The tendency to absence of the pedicle depends somewhat upon the variety of the cyst. In glandular, the tendency is to a long pedicle; in papillary, to short or absent pedicle; and in dermoid, it is short and strong.

STRUCTURE. — The internal structure of glandular cysts justifies their division into the areolar, unilocular, and multilocular. The glandular cysts, Virchow says, originate in the invagination or proliferation of the epithelium in the stroma. Continuation of these processes

causes the formation of a many-chambered, glandular, or adenomatous cyst. An areolar cyst is a conglomeration of small cysts, with thick, well-developed and vascular stroma. A number of cysts may have ruptured to form a considerable-sized one or the entire tumor may be made up of a large number of small masses, none of which will exceed the size of a plum. Unilocular cysts often attain an enormous size, but examination will disclose evidence of a previous division into numerous smaller cysts; so it may be asserted that all unilocular cysts originate from multilocular ones. A careful investigation will usually disclose small cysts in the wall, not infrequently the remains of septa in its cavity. Multilocular cysts contain a number of cysts of varying size, so arranged as to present the appearance of a single tumor. By the increase of the individual sacs, their intervening walls gradually become thinned until one after another they rupture, and the sacs coalesce to form larger single chambers. These remains of septa become still more stretched as the tumor increases in size, until they present only a cord-like surface on the inner margin of the tumor. Occasionally the vascular structure alone remains to indicate the former septum. In sudden rupture vessels of the septa are torn and extensive hæmorrhage may follow, changing the character of the sac-contents. Upon examination of a large cyst we usually find a wall with three layers, the outside consisting of pure connective tissue like the albuginea of the ovary, the middle of loose connective tissue with numerous large vessels, while the inner is rich with cells and contains numerous small vessels. The external surface of the cyst is covered with columnar epithelium, and it is lined with one layer of cylinder epithelium, which presents dif-

ferent forms in different tumors, and by its structure governs the character of the secretion in the various sacs. In the larger cyst the epithelium undergoes degenerative changes, through thinning of the septal wall. Fatty or albuminous changes cause the epithelium to disappear entirely from the wall of one or more of the larger cysts. Pfannensteil has directed attention to the possibility of the formation of papillary growths in the glandular cysts. These growths may be sparsely distributed from the inner surface of a large cyst; in others they appear as circumscribed tufts in one side of the cyst, while the remaining portion is smooth, or, again, the entire cavity may be filled with strong, branching growths, while the quantity of fluid is very scant. The larger the cyst, the greater the probability that a large portion of the wall is smooth. Cyst-contents often present a very great contrast in color and consistence, as almost colorless, a straw color, green, purple or black, thin or thick, viscid or gelatinous. The contents of the various cysts in the small tumor differ in color and consistence, in some the fluid will be thin and in others so viscid that it will not flow. The contents of smaller cysts are more consistent, and become thinner as the cysts increase in size. The specific gravity of the fluid varies from 1002 to 1020, with an average of 1012. The fluid, however viscid it is, is absolutely structureless. It contains blood-corpuscles, epithelial cells, and crystals of cholesterin, while its reaction is neutral or alkaline. Upon analysis, various forms of albumin, metalbumin, paralbumin, and albumin peptone are found.

Papillary proliferous cysts present marked proliferation of the connective tissue, which forms tufts upon the inner surface of the tumor. These branching

projections may distend the sac to bursting, the tuft project upon the outside, and lead to rapid infection of the general peritoneum. Vegetations spring up luxuriously over the surface of the ovary, and are carried to every part of the peritoneal cavity, and not infrequently by aspiration are made to penetrate the diaphragm into the thorax. The contact of the peritoneum with the infection produces extensive ascites. Similar vegetations may arise spontaneously upon the surface of the ovary, and are then known as superficial papillary. These are cases in which a small cyst is opened and infects the external surfaces. Papillary tumors rarely attain a large size, but are generally bilateral. The dendritic growths project in every direction. The projections are reddish or pearly white and glistening, often three or four inches long, and have the appearance of stems of coral. Masses occasionally undergo partial calcification; so they break easily and without bleeding.

Dermoid Cysts.—These are growths in which are found skin and mucous membrane, with all the structures generally associated with such tissues. The tissues most frequently found are teeth, hair, nails, and sebaceous and sweat-glands. Other structures occasionally seen are mammae, horn, bone, unstriped muscular fibre, and very rarely tissue resembling brain. Fat or sebaceous material at the temperature of the body is generally in the liquid state. Occasionally they are found in solid balls. Sutton reports finding three hundred of these in one sac. Hair is frequently present in great abundance, and varies in color, length, and quantity. It may be blond, brown, or black, but bears no relation to the color of the individual. Teeth are found in about one-half the cases, and may be loose, fixed, or buried in the

wall. All varieties of teeth are found. Schnabel describes a case which had three pieces of bone and one hundred teeth. Plouquet found three hundred teeth. Various bones have been described, as the jaw, petrous portion of the temple, ribs, and pelvic bones, a finger with articulated phalanges, nail and nail-fold, or entire skeleton has been recognized. Dermoids do not always occur alone, but in conjunction with large glandular cysts, the dermoid forming a small part of the mass.

Literature of '97-'98-'99.

Ovarian dermoids believed to be due to simultaneous irritation of histologically different portions of the parenchyma, each portion responding to this irritation in its peculiar way. Dermoids are usually found in combination with pseudomucin cysts, which, in all probability develop from the follicular epithelium, the combination with cysts lined with ciliated epithelium. Pfannenstiel (*Amer. Jour. Med. Sci.*, Oct., '97).

Dermoid and teratoid tumors of the ovary are ovulogenous, since they always present evidences of the three embryonic layers. It may be assured that their manner of development is not one of pathogenesis, since the latter is a physiological process. The cleavage of the ovum from which a dermoid develops is pathological. Only the earliest portions of the embryo develop, hence the prominence of the ectoderm and cephalic end, while the remaining portions either do not develop at all or are deformed. The differentiation is one-sided, and is sometimes confined to a single organ, such as a breast. In connection with this subject the question of the differentiation of sex in the ovum presents a suggestive field for future study, though the expectation of affecting this result, as claimed by Schenck, may be dismissed as vain. Kroemer (*Archiv f. Gynäk.*, B. 57, H. 2, '99).

Teratoma is a more complete form of growth of tumor which is usually classed

with the dermoid. It often attains to an enormous size, contains the various structures of the dermoids, cartilage, and a large amount of connective tissue. Dermoid growths can appear at any age, have been found in children at birth, and in women of ninety years. The contents of the dermoid sac are exceedingly irritating, and every precaution should be practiced to prevent their escape into the peritoneal cavity.

Parovarian Cysts. — The parovarium, or epoöphoron, is situated in the lateral part of the mesosalpinx and is a remnant of the Wolffian body. Parovarian tumors are almost always cystic and subserous, and consequently have a double wall. The external peritoneal is easily separable. The pedicle consists of the tube, median ovarian ligament, and the suspensory ligament. Paroöphoron and broad-ligament cysts form about 11 per cent. of abdominal tumors of pelvic origin, and both proliferating and dermoid growths have been found in this situation. They are distinguished from ovarian, first, by the ease with which the peritoneum can be stripped off; second, by the ovary being generally found attached to the side of the cyst; third, by the cyst being unilocular; fourth, by the Fallopian tube stretching over the cyst, never communicating with it; lastly, the gradual thickening of the mesosalpinx.

Solid growths of the ovary comprise 5 per cent. of the cases presenting themselves for operation. These tumors are innocent or malignant, and may become cystic.

Fibromyoma is a benign form of rare tumor, but the most common species of solid ovarian tumor. The growth is slow and maintains the normal shape of the ovary. Adhesions are rare. Williams described one which weighed seven

pounds seven ounces; Doran, one of seventeen pounds.

Sarcoma of the ovary resembles in form, size, and color a fibroid, excepting that its surface is smoother; its consistence is softer than a fibroid, though it contains much fibrous tissue, making the diagnosis at times difficult to determine. It occurs in the round and spindle-cell growths. The latter predominating, the tumor is more solid and more strongly resembles the fibroid. Spindle and round cells are frequently combined, while myxomatous transformation exists in both kinds, but cartilage- and bone-formation rarely occurs. Sarcoma combined with carcinoma has been observed in the walls of larger cysts.

Fibrosarcomata of the ovary are always bilateral, occur in young as well as in old subjects, and grow slowly, ascites being usually present. The entire ovary is affected, but maintains its usual form even when much enlarged, although the surface becomes more or less nodular. On section they show a firm, homogeneous structure with myxomatous softening in the interior; cysts may result either from the latter cause or from the dilatation of follicles. Histologically they present more or less marked hyperplasia of the ovarian connective tissue, and may be characterized as fibrosarcomata, rich in cell-elements, and with a tendency to mucoid degeneration.

Although these growths may remain stationary for a long period, they have a marked tendency to become disseminated through the lymphatics, first within those of the ovary itself, then in the vessels of the tube and corresponding broad ligament, and often in distant parts of the body. Krukenberg (*Archiv f. Gynäk.*, B. 1, H. 2, '96).

Carcinoma of the ovary is much more rare than sarcoma. The medullary formation is the most common, and may form a tumor quite as large as a man's head.

Symptoms of Ovarian Tumors.—Early stages of ovarian tumors produce no symptoms. Occasionally an apple-sized tumor, though movable, may cause unpleasant symptoms, as pain in the sacrum, which extends down the leg. Intraligamentary tumors or those prevented by adhesions from rising out of the pelvis produce severe symptoms as soon as they fill the space, especially by obstruction to stool and micturition. In large tumors distress arises from pressure, and interference with the circulation and respiration. The skin becomes stretched and forms striæ, swelling of the navel, hernia, occasionally from pressure upon the great vessels, œdema, varicosities in the legs, in the sexual apparatus, and in the skin of the abdomen. Albuminuria, diminution of urine, and compression of the renal veins are observed. Severe compression symptoms are now rarely seen from large tumors, as they are not permitted to attain large size. Menstruation is usually unaffected. It disappears comparatively early in those cases in which the follicles perish from the development of sarcoma, carcinoma, and the papillary cystadenoma when bilateral. Menstruation decreases, and the disposition to menopause is betrayed, not from absent ovulation, but as a result of constitutional conditions. Amenorrhœa may exist for several years and menstruation return after the removal of an ovarian cyst.

Literature of '97-'98-'99.

The disappearance of an abdominal cyst following the passage of large quantities of urine, usually regarded as pathognomonic of intermittent hydronephrosis, may also occur in connection with ovarian cysts.

The difficulty of distinguishing between such cysts and hydronephrosis is greatest when the tumor fills the abdominal cavity. The relation of the

large intestine to the cyst is most important, since it is only exceptionally that it lies in front of one of ovarian origin. If the gut is collapsed it may be distended by injections of effervescing salts. Vaginal examination will often throw light on the diagnosis; also catheterization of the ureter. Wilson (*Birmingham Med. Rev.*, Aug., '97).

Pleuritic effusions frequently occur in cases of ovarian tumor as a consequence of the condition. Effusion develops insidiously without pain or temperature, is most frequently bilateral, and, if unilateral, the right side is more commonly affected. It is not due to circulatory disturbance, nor to any alteration in the character of the blood, but to a propagation of the disease to the pleura, or more frequently to pleuritic reaction from irritation transmitted through the diaphragm. Sometimes it is due to an abnormal peritoneal irritation, especially in cases where ascites is present. When a pleuritic effusion not due to acute pleurisy appears in cases of ovarian tumor, it is a sign of the malignancy of the case, especially if we can exclude torsion of the pedicle, suppuration, and rupture of cysts. When the effusion is not due to extension of the disease to the pleura or lungs, operative interference is indicated, but operative interference must be determined by the situation and extension of possible peritoneal foci, as it is in these cases that pleuritic effusion most commonly occurs. Paracentesis thoracis may, in rare cases, be preparatory to laparotomy, but complete removal of the tumor is the surest way of removing the effusion. G. Resinelli (*Med. News*, Jan. 29, '98).

In ovarian cysts extensive adhesions may develop during pregnancy as well as after delivery. Torsion of the pedicle may follow the emptying of the gravid uterus in consequence of the sudden change in the intra-abdominal pressure. Infection of the cyst during the puerperium is well known, Zetter having reported twenty-one cases. Gottschalk (*Frauenarzt.*, Nov., '98).

Diagnosis of Ovarian Tumors.—Diagnosis of ovarian tumors is mainly se-

cured by physical signs. The questions to be considered are: first, have we a tumor under consideration; second, the existence of a tumor recognized, is it an ovarian growth; third, an ovarian tumor admitted, we ascertain its relations to the surrounding parts, the existence or absence of a pedicle or adhesions; fourth, the variety of ovarian tumor. For purposes of convenience of diagnosis ovarian growths are divided into two classes: those small, and situated within the pelvis, and the large, where they rest upon its brim. The abdominal enlargements other than tumors with which the ovarian growth may be confused are obesity, dermoid tumor of the abdominal walls, ventral hernia, tympanites, faecal accumulation, distended bladder, and ascites.

In obesity the history of development, the general distribution of adipose, and the thickness of fat-accumulation in the abdominal wall should be contrasted with the general emaciation which characterizes a large ovarian cyst.

DERMOID tumor of the abdominal wall occurs in the muscle-wall, taking the nature of a fibroid. From its weight, it becomes very dependent; sometimes extends to the knees; is quite movable, very superficial, and hard. Its situation in the wall, its density, and failure to recognize by vaginal or rectal examination any connection with the pelvic viscera should determine its character.

VENTRAL HERNIA.—The recognition of the coils of intestine, and peristaltic action, through the thin wall, is sufficient. Tympanites or phantom tumors, a condition similar to pseudocyst, is sometimes mistaken for ovarian cyst. A loud volume of resonance is easily recognized, and differentiates it from a cyst. It is true that occasionally a cyst may have a communication with the intestine, which will permit gas to enter it and

thus afford resonance. Even in these cases a sensation of fluctuation is secured which is absent in the phantom tumor. The latter tumor entirely disappears when the patient is placed under an anæsthetic.

FÆCAL ACCUMULATION occurs in the colon or transverse portion of the gut, which may descend and lie directly over the pelvis. The accumulations are occasionally quite extensive, but are recognized by their length, by the peculiar sensation under palpation, leaving an imprint under pressure; most of all, by the fact that they disappear with purgatives and enemas.

DISTENDED BLADDER causes symptoms of a tumor in the lower part of the abdomen, which fluctuates, and may readily be mistaken for an ovarian cyst. The suspicion is apparently confirmed by the history that the patient is passing urine in small quantities or that it is continually dribbling. This, however, should at once cause a suspicion of retention of urine and the introduction of a catheter by which the tumor is dispersed.

ASCITES.—With uncomplicated ovarian cysts diagnosis from ascites is not difficult. They have in common enlargement of the abdomen, fluctuation, and symptoms arising from pressure against the diaphragm. Both may be characterized by progressive loss of strength and flesh, more or less œdema of other parts of the body, and an enlarged abdomen. In ascites, the abdomen is more or less flattened, its widest diameter transverse, while an ovarian cyst is most prominent in the vertical diameter, and narrow from side to side. Fluctuation over the abdomen is very distinct in ascites and in unilocular ovarian cyst, but its wave extends nearer to the vertebræ in ascites. In the well-filled cyst the projection of the ver-

tebræ prevents the approach of the fluid in the lumbar region. In multilocular cyst the wave is more broken and frequently is only recognized as a sensation of elasticity. Loss of strength is frequently greater in ascites, while emaciation is more marked in ovarian cyst. In renal and cardiac disease there is a greater disposition to anasarca. In very advanced and large ovarian tumor pressure may exist, and considerable dropsy of the extremities, but the abdominal distension is in greater proportion. In palpation, ovarian tumor presents greater resistance, and the outline of the surface is more distinctly determined. The abdominal surface can be moved over it. Percussion affords the most valuable information, and ascites a distinct zone of resonance over the abdomen or part of greatest prominence, while the more dependent portions are dull. The zone of resonance changes with the position of the patient; in ovarian cyst, on the contrary, there is dullness upon percussion over the whole surface of the tumor—resonance only after we have passed beyond its limits, and the line of resonance does not change with the position of the patient. In tubercular peritonitis and in hepatic dropsy, where the mesentery has undergone contraction and the peritoneum is very much thickened, diagnosis can be so obscure as to require abdominal incision to determine it. Ascites may complicate an ovarian cyst. By displacement of a layer of fluid the hand will come in contact with the cyst. The amount of resistance will afford information as to whether the tumor is solid or cystic. Complication of a cyst by ascites should awaken suspicion of malignancy or some degenerative process. The greater the amount of ascites, the more probably the growth is malignant. The uterus is freely movable in ascites

and ovarian cyst, displaced either downward and backward or upward and forward. In ascites arising from rupture of papillary cyst the recognition of a dense, thickened mass upon either side the uterus should cause a suspicion of its true character.

Second, is the tumor under our observation an ovarian growth? The physical signs vary with the size and situation of the tumor. In its early stage it is entirely within the pelvis, and its position varies. When as large as a hen's egg it falls into the pelvis, where it remains until it attains a size which will no longer permit its accommodation in that situation. Its relation with the corresponding side of the uterus permits its determination by conjoined manipulation. Where the condition has been complicated by peritonitis, the diagnosis may be difficult. Fluctuation or even elasticity does not characterize the smaller growths. It is absent entirely in proliferating cystomata, in dermoids, and often even in single cysts. If we are unable to separate the tumor from the uterus and determine the existence of a pedicle, it can be accomplished by seizing the uterus with a vulsellum while the patient lies upon her back, and with two fingers in the rectum differentiate the borders of the uterus and the relation of the latter to the growth. In small growths the hand over the abdomen and finger in the rectum will generally enable us to outline them. Fibroid tumors of the uterus and inflammatory growths of the tubes are likely to be confused with small ovarian cysts. Tubal growths are pyosalpinx, hydrosalpinx, and hamatosalpinx, the characteristics of which we have already discussed. In pyosalpinx the acute history, marked tenderness, existence of inflammatory exudation, and the matting together of the pelvic tis-

sues should distinguish it. A hydrosalpinx is generally movable, gives a sensation of elasticity or of fluctuation, but the tumor is oblong and gourd-like, rather than spherical. A hæmatosalpinx is situated to one side of the uterus, is at first soft, but becomes harder from the coagulation of blood. In the large abdominal growths an ovarian cyst distends the abdomen, particularly at its lower part, rises abruptly from the pubes, and is sharply defined and symmetrically developed. In large single cysts the surface will be smooth and regular, but, in the multilocular, projections and irregularities are found. When made up of a large number of small cysts, it will be more resistant, although it will still present a sensation of elasticity.

Large growths are confounded with pregnancy, hydramnios, extra-uterine gestation, uterine myomata, retroperitoneal growths, and tumors of the various viscera of the abdominal cavity.

PREGNANCY.—The enlargement of the abdomen is more rapid, is generally associated with suppression of menses, and the presence of sympathetic nervous phenomena, while in the more advanced stage the patient presents a florid, healthy appearance. Errors are more likely to occur in the unmarried during the early stage of pregnancy. The physician should not be hasty in expressing an opinion, so long as there is any reason for doubt. The examination a few weeks later will dispel uncertainty. As pregnancy advances, foetal movements, heart-sounds, and parts of the foetus are recognized. Foetal heart-sounds, when heard, are characteristic. Gestation in one horn of a bicornate uterus will make the diagnosis difficult, but a careful bimanual examination will demonstrate the association of the enlargement with the uterus. Under no circumstances should

the size of the uterus be determined with the probe when there is the least suspicion of pregnancy.

HYDRAMNIOS is a pathological form of pregnancy in which a large collection of amniotic fluid occurs in the uterine cavity. When the collection exceeds two quarts upon examination for ovarian cyst, the history is of value. Hydramnios comes on suddenly, occurs about the sixth or seventh month of a pregnancy which has previously run a normal course. The physical examination will disclose an enlarged uterus, cervix frequently obliterated, os open, covered with a dense membrane through which, by manipulation, we may distinguish the parts of the foetus or determine ballottement.

EXTRA-UTERINE PREGNANCY.—An ectopic gestation sufficiently large to permit it to be confused with an ovarian cyst will present the symptoms of an early pregnancy, possibly indications of rupture of the sac and internal hæmorrhage. In advanced stages foetal movements and heart-sounds will be heard. Vaginal palpation discloses the foetal parts covered with the thin wall. After death of the foetus changes will occur which render the diagnosis more difficult. The foetus shrinks, becomes macerated, decomposition in the sac occurs, which renders it resonant, while at the same time fluctuation is distinct. The diagnosis is determined by careful analysis of the subjective symptoms, associated with a thorough physical examination.

UTERINE MYOMATA.—Slow growth, resistance of the tumor, presence of multiple growths, irregular contour, and relation to the uterus afford confirmation in the diagnosis. The difficulty may be as great in œdematous fibroids and in fibrocystic tumors. Double ovarian cysts, particularly where the pedicle is

short or absent, may so drag up the fundus uteri as to make it appear that they are a part of the organ itself. The relation of the uterus to the tumor is best determined by drawing down upon the cervix with a volsellum, which is held by an assistant, while a second assistant draws up the tumor through the abdominal walls and simultaneously the operator with one or two fingers in the rectum, the hand over the abdomen, seeks the pedicle and determines its relation to the uterus.

Literature of '97-'98-'99.

It is often impossible to distinguish fibroma of ovary from a pedunculated subserous uterine fibroid. Hegar's method of diagnosis is trustworthy; the finger is passed into the rectum, and pressed against the tumor, at the same time the uterus is drawn downward by a volsella. If the tumor be ovarian, it will not move; if uterine, there will be great resistance to drawing down the cervix, which will clearly be continuous with the morbid growth. True fibroma of the ovary often sets up ascites, yet is rarely adherent to adjacent structures. It is never invested by a distinct capsule, like a uterine myoma. It undergoes different kinds of degeneration, even malignant, contrary to the opinion of many observers. Barremano (*Ann. de l'Institut. de St. Anne. Bruxelles. vol. ii, No. 98*).

Third, the relation of the tumor to the surrounding parts, the character of the pedicle, and the presence of adhesions. The mobility of the tumor is dependent upon the length of its pedicle and the absence of adhesions. The tumor which can be pushed about without dragging upon the uterus and can be displaced from side to side, the abdominal wall sliding over it, is recognized as free from adhesions and having a long pedicle. Rapid enlargement, tenderness of the abdomen, sensation of crepitus as

the abdominal wall is moved over the tumor, indicate recent and extensive adhesions from peritonitis. Limited adhesions of the omentum, intestine, and abdominal wall cannot be excluded.

Torsion of the pedicle is recognized by the onset of sudden and severe peritoneal symptoms, severe pain in the belly, meteorism, vomiting, and accelerated temperature. Rapid growth of the tumor and tenderness of its surface indicate that torsion has been followed by intra-cystic hæmorrhage or increased exudation. Sudden collapse followed by symptoms of internal hæmorrhage and peritoneal irritation indicate the occurrence of hæmorrhage. Acute torsion is difficult to differentiate from rupture of an ovarian cyst, and peritonitis from perforation of the stomach or intestines, renal or gall-stone colic, ileus, and rupture of ectopic gestation. We can only arrive at a conclusion from careful investigation of the history.

Inflammation of the tumor is characterized by sensitiveness, radiating pain, sudden enlargement, or the suppuration lead to the formation of gas and the development of tympanitic resonance. Rupture of a cyst is recognized by sudden oppression, suffocation, nausea, sometimes vomiting, diarrhœa, acceleration of the pulse, moderate elevation of temperature, presence of free fluid in the peritoneal cavity, and indication of decrease in the size of the tumor, with strong diuresis. Tumor limits are indistinct and there is no alteration of resonance with the change of position.

Diagnosis as to Varieties of Ovarian Tumor.—The glandular proliferating cyst is the most frequent, and attains the largest size. They are mostly multilocular, and consequently present a less-marked wave of fluctuation. Fluctuation is an indication of its cystic character and

is very distinct in the unilocular and large chambered cysts. Instead of fluctuation we not infrequently find elastic stretching which can be produced by œdematous, solid growths, and enlarged cysts whose contents are made up of colloid or very thick, viscid material. In fluctuating or tough, elastic tumors which are nodular we find a cystadenoma. A large fluctuating tumor is not necessarily a unilocular cyst; generally a small cyst which makes no symptoms is not a cystadenoma, but a dermoid or parovarian, or, more probable still, a simple retention cyst of the ovary.

Papillary growths of the ovary are of three kinds—the true ovarian papilloma, the colloid papillary cystoma, and the papillary cystocarcinoma. A case of endothelioma also met with, taking the form of papillary excrescences in an ovarian cyst. The ovarian papillomata resemble each other in their naked-eye characters, in the formation of excrescences on the outer surface of the cyst-wall, in their implantation on the peritoneum, and in the concomitant existence of ascites; further, both are frequently bilateral and intraligamentary in nature. But the ovarian papilloma is to be distinguished by the following characters: it is quite benign; its epithelial proliferation never invades surrounding tissues in a destructive way; it grows slowly and does not occasion cachexia; and it does not cause typical metastatic growths. Generally papilloma retains its benign character, even when it has existed for several years. On the other hand, the papillary cystocarcinoma is from the beginning a true carcinoma, and not a papilloma with cancerous degeneration. The ovarian papilloma most often originates in the surface epithelium of the ovary. When extirpated, such a growth does not return; but the other ovary, even if apparently healthy, ought always to be removed also, for it will ultimately develop similar tumors. Oscar Semb (*Supp. Norsk Mag. f. Laegevid.*, Oct., '96).

Dermoid tumors are recognized by their irregular consistency, in some places soft and in others hard. The recognition that the tumor has been in existence for ten years or more will indicate a probable dermoid. Olshausen differentiates parovarian growths by moderate size, slow growth, thin, relaxed walls, light fluid contents, and very distinct fluctuation. Large cysts are generally multilocular.

Double intraligamentary growths and the presence of ascites with small tumors is a presumption of papillary growths, but not a positive indication. Superficial papillomata feel firm, nodular, and often extend diffusely into the pelvis. A rapid-developing ascites in which renal, cardiac, and hepatic causes can be excluded, should, in the presence of bilateral resistance, awaken a suspicion of ruptured papillary ovarian cyst. Pronounced solid consistence of a growth is common to ovarian fibroid, sarcoma, endothelioma, carcinoma, and teratoma. An ascitic accumulation as a complication is a presumption of malignant trouble. Pronounced cachexia and marasmus may be produced by certain complications, as rupture, torsion, inflammation, also in tumors of normal size. Rapid growth especially speaks for malignancy. Olshausen directs attention to premature œdema of the legs as a symptom of cancer.

Etiology.—Various theories have been advanced as a cause for the development of ovarian tumors. Cohnheim believed them to originate from retained embryonic products. It was formerly supposed that the dermoid was thus derived, but the diversity of structure found in the dermoid, and especially in the teratoma, precludes the possibility of such origin and favors the assertion that they arise from ovum-cells which have been sub-

jected to some special irritation. The variety of irritation, whether mechanical or chemical, animate or inanimate, differs in various kinds of tumors is as yet unknown. It is probable that it is chemical irritation which has proceeded by way of the uterus and tubes. Susceptibility for the acceptance of the tumor exciters varies in different individuals, in which the heredity, acquired disposition, age, trauma, scar-formation, and inflammation are important factors. Age has no special significance, though glandular cysts are more frequent between the thirtieth and fiftieth years. All varieties are less frequent in childhood and old age. Ovarian growths are more frequent in the single than in the married.

Course.—Proliferating cysts grow more rapidly than either the dermoid or solid tumors unless the latter are malignant. A rapid increase in the size of a growth noticeable from day to day is due to hæmorrhage. When the pelvic structures are normal, an enlarged cystic ovary will drop by its weight into Douglas's pouch. As it increases in size, it advances in the direction of least resistance, which is upward, and pushes before it the intestines, when it will rise out of the pelvis and impinge against the abdominal wall. It then assumes a central position. The tumor lies directly above the uterus, rests on the brim of the pelvis, and causes but little inconvenience. Occasionally it may become impacted, because of irregularities in its growth or from extensive adhesions. The tumor rests upon the pelvis; as it advances it pushes the intestines upward and laterally. If undisturbed, the enlargement becomes so great that the diaphragm is pushed upward, severe pressure symptoms follow, and the action of the heart and lungs is obstructed. Marked suffering, emaciation, and the development of the charac-

teristic facial expression known as *facies ovariana* follow. The presence of ovarian tumors does not interfere with ovulation and menstruation, even though both ovaries are involved, so long as ovarian stroma remains. Thornton reports a case of pregnancy with bilateral dermoid disease.

Complications.—Among the complications or ovarian tumors, ascites occurs infrequently with cystic growths, unless from rupture, but is very frequent in the solid. The cause is unknown; it may possibly arise from pressure upon the vena cava or large veins. The œdema may enlarge one or both legs. The ureter and pelvis of the kidney may be dilated.

The most frequent complication is the formation of adhesions between the surface of the tumor, the omentum, the intestines, the uterus, the bladder, and the abdominal wall. These adhesions arise from inflammation, as in peritonitis. When not associated with inflammation they arise from loss of epithelium from the surface of the cyst, through friction. Adhesions may become dense, firm, often thread-like, and may convey large vessels between the omentum and growth. Adhesions are frequent in dermoid growths. When adhesions exist between the tumor and bladder, an opening may occur through which its contents are evacuated; openings also occur between the tumor and bowel. Adhesions are of importance because of the increased difficulty in the removal of the growth.

TORSION OF THE PEDICLE is a quite frequent complication. It is only when the alteration is sufficient to influence the circulation that it produces disturbance. The right-sided tumor turns to the left and the left-sided to the right. The cause of the torsion is unknown. Küstner ascribes it to peristalsis and the

varying distension of the rectum; Cario to sudden belly pressure; Mickwitz to contraction of the transversalis muscle. It is very frequent when associated with pregnancy; may occur also from injury. The twist may involve one or two turns of the pedicle, though as many as six twists have been observed. The tendency to torsion of the pedicle is favored by the existence of a long, membranous pedicle, spherical form of the tumor; still further by pregnancy, labor, and childbirth, through the changing relations of the organ in the abdominal cavity. Torsion is the cause of obstruction of the vessels, in which the thin-walled veins suffer before the more resisting arteries. The pumping of blood into the tumor by the artery and its inability to escape by the vein gives rise to rapid increase in the size of the tumor. Fatal result can occur from hæmorrhage into the abdominal cavity. Hæmorrhage may be arrested, but the nutrition of the tumor suffers, its covering epithelium is lost, extensive adhesions follow between its surface and the omentum, intestines, and parietal peritoneum. Adhesions at first are very loose, subsequently become organized. The growth thereby obtains a new source of nutrition. Where the twisting of the pedicle is sufficient to obstruct the arteries, the entire circulation is cut off and necrosis of the growth results. Necrosis is followed by shrinking of the tumor and absorption of its fatty contents; peritonitis may follow, and extensive ascites exist. Peritonitis arising independently of micro-organisms is due to irritation from the presence of a foreign body or the chemical products of the tumor. Sometimes suppuration of the tumor and pyæmia ensue.

Literature of '97-'98-'99.

An ovarian tumor may, in consequence of torsion of the pedicle, have its cir-

culatation cut off to such an extent that its vitality is destroyed, and gangrene, suppuration, and death may ensue unless adhesions are so extensive as to furnish a sufficient supply of blood to the parts. Other suppurating tumors result from the passage of pathogenic germs from the bowel through the walls of the tumor. These germs are the pyogenic cocci, such as the streptococcus and more frequently the bacillus coli communis. W. H. Wathen (Med. News, Oct. 15, '98).

Dermoid growths are occasionally found free in the abdominal cavity or in pedicle-like adhesion with other structures. Ileus has resulted from adhesions of the intestines to the tumor or to the pedicle. Torsion infrequently may produce no symptoms. These are usually slight, and can be suspected when the patient suffers a severe pain associated with meteorism, sensibility to pressure, acceleration of the pulse, sometimes singultus, vomiting, and fever.

Thirteen cases of strangulated ovarian cysts met with out of a little over one hundred. It is important to recognize the condition early. If the twist occur suddenly symptoms are very characteristic. The woman, being previously in comfort, is suddenly seized with severe abdominal pain, sometimes sufficient to make her feel faint, and generally followed by some vomiting. There is a diffuse tenderness over the whole abdomen. The patient, if she knows that she has previously had a tumor, will note that coincident with the attack the tumor seemed to swell up and become hardened. On abdominal examination the tumor may be felt of a globular outline, but generally of not a very large size. It is tender on pressure and has a somewhat firmer feel than the majority of ovarian cysts. It can be moved from side to side. Occasionally some creaking can be heard and felt. *Per vaginam* the uterus is probably movable, and the tumor, if felt at all, is lying higher up, only resting on the brim of the pelvis. The general condition is one of distress. Pulse is rapid and the tem-

perature more often raised than not. If the temperature is raised the prognosis is far more favorable than when the same symptoms are present with a normal or subnormal temperature. Symptoms resembling those of a twisted cyst may be due to a simple inflamed cyst, a ruptured cyst, an extra-uterine foetation, or an hæmatocele.

If symptoms be due to the rupture of a cyst there will be the same sudden symptoms as if a twist had occurred, but the outline of a twisted cyst is well defined, feels firm, and the tumor is somewhat larger than previously, while in a ruptured cyst the outline of a tumor becomes indistinct and feels flaccid, is smaller, or even disappears, while there is dullness in the flanks from gravitation of the extravasated contents to these regions. When the symptoms are due to a ruptured extra-uterine foetation there will often be a history of missed, or at least irregular, periods. There may be suggestive signs about the breasts. Pain is more pronounced, while it is almost invariably accompanied by fainting and other symptoms of collapse. The anæmic condition of the tissues, soft, rapid pulse, and sighing respiration suggest bleeding, while an abdominal examination shows there is no definite tumor. These symptoms collectively can scarcely be mistaken for a twisted cyst. On the other hand, a limited hæmatocele into the broad ligament or into Douglas's pouch may closely resemble a twisted cyst. In such a case the tumor in Douglas's pouch and the fixing of the uterus should have suggested the nature of the case. If a twisted cyst is not diagnosed early the symptoms may rapidly pass on into those of acute peritonitis, and, owing to the distension of the intestines disguising the cyst, the diagnosis is obscure. Directly the nature of the case is suspected the abdomen should be opened and the cyst removed. Harrison Cripps (*Lancet*, Feb. 15, '96).

Literature of '97-'98-'99.

Ovarian tumor, if acute torsion be present, shows an hæmorrhagic or pink surface, with a certain amount of surface œdema. The symptoms usually

come on suddenly, with a feeling of something displaced in the abdomen. The pain is at first localized over the affected ovary, but rapidly becomes general, extending into the loins and down the thigh on the affected side. Vomiting is an early symptom. At first it is mucous, and later becomes green. Abdominal respiration is suppressed. There is constipation, often almost complete. The face is usually somewhat drawn and pinched. The pulse is small and quick, and the temperature rises one or two degrees. Death may occur from various causes if speedy help be not given. Acute peritonitis may ensue, or hæmorrhage into the tumor, which may be followed by rupture. If the patient survives the acute stage, chronic peritonitis, with the formation of numerous adhesions of the cyst-wall to the abdominal viscera, often follows. Sometimes the cyst may suppurate. Chandellux (*Soc. de Chir. de Lyon*; *La Gynéc.*, June, '98).

Two conditions are essential to the production of a torsion of the pedicle of an ovarian tumor: a long, slender pedicle, and a small tumor, not larger than a fist, or at most a cocoa-nut. The size of the tumor when removed does not indicate its size when torsion occurred; for it grows with each twist. The torsion may be either gradual or sudden, either partial or total. The pedicle may be twisted once on itself or many times, until it has become so thin as to appear on the point of breaking. Salient features in diagnosis of a twisted ovarian pedicle are: moderate distension of the subumbilical region, with greater prominence either in the median line or on either side; rapid formation of swelling, which perhaps was merely noticed before; more or less tenderness on pressure; tense but distinct fluctuation, with single or interrupted wave according as cyst is single or multilocular; outline of swelling generally distinct, but sometimes diffuse; dullness on percussion over area of swelling; tumor touchable through anterior vaginal vault, and continuous with suprapubic swelling; uterus generally posterior to vaginal swelling; fluctuation-wave in vagina

continuous with abdominal wave; temperature somewhat elevated, perhaps to 102°; pulse rapid and small; general depression; anxious countenance. Attack has usually come on suddenly, and may have been preceded, at an interval of several weeks or months, by a similar less marked seizure attended by severe pain. P. F. Mundé (N. Y. Med. Jour., Feb. 25, '99).

INFLAMMATION AND SUPPURATION of the cyst is a complication which may occur, though much less frequently than formerly, when puncture of the cyst was often practiced. Infection may extend by the uterus and tube, or by intestine, particularly where adhesions occur between the latter and the sac. Dermoid tumors are inclined to suppurate, probably as a result of injuries which they undergo during their long duration in the body. The occurrence of inflammation and suppuration is indicated by fever, which varies in intensity according to the extent of infection. The patient experiences but little pain, unless peritonitis is associated. Adhesions to the suppurating tumor may occur and the pus make its exit to the bladder, rectum, or vagina. It is rarely that it is completely evacuated and spontaneous recovery follows. Death usually occurs from pyæmia. Rupture into the peritoneal cavity is rapidly followed by fatal peritonitis. Such a tumor opening into the bladder produces the greatest distress, as hair, teeth, and pieces of bone are thus discharged, sloughs are impacted in the urethra, inducing cystitis, retention of urine, and marked vesical tenesmus. Fragments, when retained in the bladder and coated over with salts, form the nuclei of calculi.

RUPTURE OF CYSTIC TUMORS.—The rupture may occur suddenly as a result of a fall or blow, or gradually from changes in the cyst-wall. In papillary

growths the pressure of the vegetation causes thinning of the cyst-wall, and finally rupture, or the growths extend through the wall of the cyst and on its external surface. Rupture of the cyst can occur into the surrounding viscera, but more frequently into the peritoneal cavity; in thin-walled cyst occurs easily under manipulation to determine the diagnosis, change of position in bed, the act of coition, or vomiting, and occasionally occurs without assignable cause. The effect of the accident will depend upon the character of the cyst-contents. In unilocular cysts no untoward symptom occurs beyond excessive flow of pale urine. In single parovarian cysts recovery may follow the rupture. Generally, however, the opening closes and the fluid reaccumulates. In rare cases it is followed by high temperature, rapid pulse, vomiting, pressure at stool, and diarrhœa, which indicate the condition of the contents: a kind of autointoxication. In multilocular and dermoid growths rupture into the peritoneal cavity is often followed by infection, rapidly developing peritonitis, and finally death. Rupture of papillary cysts results in infection of the peritoneum and the formation of ascites. Vegetations spring up over the entire cavity. Sometimes an artery is torn in the rupture, and marked hæmorrhage with profound anæmia follows. The occurrence of rupture is recognized by disappearance of the tumor, diminution of its size, recognition of free fluid in the peritoneal cavity, peritonitis, collapse, diarrhœa, and diuresis.

Literature of '97-'98-'99.

Rupture of ovarian cysts divided into spontaneous and traumatic. One hundred and eight collected cases of the latter variety may be further subdivided into ruptures—due to movements of the body as a whole, 30 per cent.; and due

to direct trauma, 70 per cent. Cases the result of torsion or parturition are not included.

Of the 70 caused by direct traumatic influences, 34 were the result of falls and 10 occurred during examination. Fate of the patient in 75 cases unoperated upon shows a mortality of 32 per cent., 8 of these being immediate, probably as the result of shock or hæmorrhage, while in 16 others the ultimate death from peritonitis was the result of the rupture. Mortality from traumatic rupture is thus somewhat lower than the average of mixed spontaneous and traumatic ruptures (41 per cent.), the spontaneous being specially prone to give rise to peritonitis, from their more complex contents. Twenty-six per cent. of cases recovered after more or less peritonitis, while 44 per cent. showed absolutely no symptoms of peritonitis; many of these were probably parovarian.

Clinical difference between traumatic and spontaneous rupture is chiefly to be found in the sudden outpouring of a much larger quantity of fluid into the peritoneal cavity. The initial pain varies from agony to such slight discomfort that the patient is almost unaware of the injury. The subsequent fate depends greatly on the character of the escaped fluid. In 9 instances the tumor did not return. Fatal hæmorrhage was found to be rare, though doubtless, from the symptoms so closely resembling shock, this may have been overlooked. Recently several cases have been reported, in which the urine showed the presence of peptones after a rupture. Storer (Boston Med. and Surg. Jour., vol. cxxxv, No. 21).

Ovarian tumor may be complicated with PREGNANCY. It is more frequent in the one-sided, though it may occur in the double-sided ovarian tumor. It can occur with any variety of tumor, though more likely to complicate the slow-growing formations. Numerous cases are recorded where the person carrying an ovarian tumor has run successfully the gauntlet of several pregnancies. The

ovarian tumor does not grow so rapidly in pregnancy as does the fibroid. The occurrence of pregnancy will depend upon the size of the tumor. Very large tumors may, with increased size from pregnancy, cause marked dyspnœa, requiring interference. The influence upon the labor will depend upon the situation of the growth. The very large growths interfere with uterine contraction, and especially the voluntary assistance. If the tumor rests above the uterus and presses it down in a position of retroversion, or retroflexion, it may cause impaction and finally abortion. A tumor situated in the pelvis below the uterus interferes with delivery, and unless it can be displaced its size must be reduced.

DEGENERATIVE CHANGES IN THE CYST-WALLS.—The cyst-walls can undergo the following degenerative processes: First, calcification; second, fatty degeneration; third, atheromatous changes; fourth, changes due to infarctions.

Literature of '97-'98-'99.

There are two varieties of carcinoma developed from the wall of ovarian dermoids, viz.: 1. Carcinoma of the glandular type, of which there is but one recorded case, that of Yamagiva. 2. Carcinoma of the epithelial type. Of this variety there are eight cases on record. All glandular and dermoid cystic tumors of the ovary should be removed before the supervention of the carcinomatous change. Clark (Amer. Jour. of Obstet., Sept., '98).

Treatment.—No other treatment is now recognized as worthy of consideration in the treatment of ovarian cysts other than their extirpation. Puncture or paracentesis was formerly an accepted procedure, but experience has disclosed that it is attended with danger. It is but palliative, and presents

the possibility of puncture of a large vessel in the tumor-wall, with consequent hæmorrhage; infection of the peritoneal cavity by escape of the contents of a papillary cyst or colloid material, infection with the cyst followed by inflammation and suppuration, are possibilities which should preclude the practice of this procedure.

OVARIOTOMY.—Extirpation of the tumor is known as ovariectomy. Success in its performance will depend upon the care with which the diagnosis has been made, the knowledge the operator has as to the condition of the patient, his dexterity in the performance of the operation, and judicious treatment subsequently.

Indications.—It was formerly a rule that patients should not be subjected to an operation until the tumor attained to such size that the patient was beginning to suffer inconvenience from the distension. The introduction of the principles of antiseptic and aseptic have rendered such postponement unnecessary.

The large proportion of tumors in which malignant complications result, the danger from injury of the growth and torsion of its pedicle, indicate the necessity for early operation.

Operation.—The operation consists in: first, the incision of the abdominal wall; second, puncture of the cyst and separation of adhesions; third, ligation of the pedicle and removal of the cyst; fourth, exploration of the remaining ovary and toilet of the peritoneum; fifth, drainage; sixth, closure of the wound; seventh, dressing. The abdominal incision is made in the median line about three inches in length midway between the umbilicus and symphysis. Incision is made through skin, superficial fascia aponeurosis, and deep fascia to the peri-

toneum. It is generally aimed to make this incision through the linea alba, but in undilated abdominal walls the separation may be so slight as to render it difficult. The sheath of the rectus muscle is opened from the side; the incision should extend through the muscle, as its injury is immaterial. Bleeding vessels are secured before the peritoneum is opened; it is then picked up and incised between forceps so as to avoid injuring the sac or a knuckle of intestine which may be situated in front of it. With the completion of the incision, the pearly-white sac is exposed. It may be explored by introducing the hand, passing it around the tumor, thus recognizing the presence or absence of adhesions. With an assistant pressing the sac firmly against the wall, a trocar to which a long rubber tube is attached may be plunged into the tumor and the fluid carried into a vessel at the side of the table. In the absence of the trocar an ordinary glass syringe-nozzle can be utilized. Incision is made with the knife into the tumor-wall and then the syringe-nozzle introduced. The assistant presses the tumor down against the abdominal wall, and keeps it tense. As the fluid is discharged the sac becomes relaxed. It should be seized with hæmostats or cyst-forceps and drawn out so that the opening is kept outside the peritoneal cavity, to prevent its being soiled with the tumor-contents. As the sac is drawn out, the adhesions are separated; those which are recent and soft may be overcome by pressing against them with a sponge or gauze pad. In this way the adherent intestines are sponged away from the cyst. Where the adhesions are old and firm, they require scissors or knife to accomplish their separation. Bleeding vessels in these adhesions should be secured with hæmostat or immediately ligated. Where

the adhesions are very firm and short, so that the intestine lies directly upon the tumor-wall, separation will frequently be attended with marked injury to intestine. To prevent this, a portion of the sac-wall should be permitted to remain in contact with the intestine, taking the precaution to strip off from it the secreting surface. The adhesions should be as far as possible separated under the eye, keeping a watch for large vessels and avoiding injury to intestines, and particularly to the spleen and liver. Vascular adhesions in the omentum should be at once secured either by clamp-forceps or ligature.

Ligation of the Pedicle and Removal of the Cyst.—Ligation may be accomplished with silk or catgut, preferably the latter. In a long, slender pedicle it is transfixed in the centre, ligated in two portions. Thicker, shorter pedicles, may be ligated in several sections or it may cut through the pedicle, using clamp-forceps to secure it and ligate the vessels separately. After ligation of the principal vessels clamp-forceps are removed and the surfaces carefully observed for further bleeding. In these cases the peritoneum is sutured over the raw surface. Where the pedicle is ligated in sections the sutures should be interlocked to prevent their tearing below, which might cause serious bleeding. In large cysts, for the withdrawal of the cyst the pedicle is seized with clamp-forceps and the cyst cut away as a preliminary to the ligation.

Having secured the pedicle we proceed to the investigation of the other ovary and the toilet of the peritoneum. The investigation of the remaining ovary is important for the reason that not infrequently a smaller cyst is found in it which will be readily overlooked and which will necessitate a subsequent operation were this investigation omitted.

Where a cyst of considerable size exists, the ovary should be removed. Smaller cysts in the ovarian diseased structure may be resected or the cysts may be punctured with a thermocautery. Where the ovary can be saved it should be done. We now proceed to the thorough investigation of the peritoneal cavity, looking over the points at which separation has taken place, in order to make sure that no vessels of large size are bleeding. Instead of spending time, however, in sponging out the blood, the better plan of procedure is to irrigate the cavity with a large quantity of normal salt solution. If there are no bleeding vessels of size, the cavity may be filled up with this fluid and the wound closed. All bleeding vessels, however, should be secured by ligature.

Literature of '97-'98-'99.

From study of many cases treated by the several methods of operation, the following conclusions are drawn: 1. That an irreparably damaged tube, ovary, etc., should be removed by enucleation, with ligation of vessels only, using only absorbable ligatures. 2. That enucleation is the simplest, safest, and most scientific and æsthetic method of removing an ovarian cyst, tumor, etc., of the ovary, the tube, the uterus, etc. There is no danger of hæmorrhage; if a vessel is severed it can be caught at once and ligated. J. Coplin Stinson (Canada Lancet, Jan., '99).

Results of operations for malignant neoplasms of ovary at the Würzburg Clinic during seven years: 55 out of 239 cases of ovarian tumor, including papillomatous cysts, were malignant. Of these, 23 were inoperable; 16 of the 32 in which an operation was performed were cancerous, 8 patients succumbing to the operation. Recurrence occurred in 3 instances, 20 per cent. of the patients being cured; 81.8 per cent. of the cases of papillomatous cyst had no recurrence, and 2 patients died. Total percentage of cures in all cases was 46.8 per cent.

Geyer (Inaug. Dis.; Centralb. f. Gynäk., No. 32, '98).

Pozzi regards retention of a certain portion of ovarian tissue as of great importance, as in this way menstruation is often conserved. Indications for resection are found in benign cysts. In proliferating cysts there is danger of malignancy, and the clinical symptoms of malignancy should receive due weight. If both ovaries are affected and there is a probability of malignancy, total extirpation should be done. If the disease is malignant and confined to one side, the removal of ovaries is justifiable. In cases of chronic ovaritis the almost complete integrity is a necessary condition in deciding on the preservation of the ovaries. Advanced sclerosis calls for complete removal. Partial operation is indicated in: (a) Follicular cysts of the ovaries. Provided that the tube is sound and that part of the ovary is healthy, resection of the cysts is sufficient, and part of the ovary may be left behind. (b) Cysts of the corpus luteum. Their presence does not necessarily imply total degeneration of the organ, and as a rule preservation of a healthy portion is possible. (c) Sclerocystic or microcystic ovaritis characterized by the presence of numerous small cysts which exist independently from lesions of the tubes. Hunter Robb (Cleveland Med. Gaz., Dec., '97).

In operations on ovarian cysts and cystic ovaries any portion of ovarian tissue which appears normal, even though small, should be retained; resection and plastic operations should be practiced on women when pregnancy is liable to occur, and delivery at term can be conducted with safety. In two cases of adherent and retroverted uterus with enlarged, prolapsed, and cystic ovaries, the cysts were excised from the glands, and the cut edges sutured with fine silk, the result in both being equally satisfactory. In one, a woman 35 years of age, there was disappearance of all pelvic symptoms: in the other menstruation followed without pain or other morbid symptoms. J. C. Stinson (Occidental Med. Times, Oct., '97).

In cases of small ovarian cysts an at-

tempt should be made to save a small portion of healthy stroma. Under no circumstances should an ovary be spared when the opposite one is the seat of carcinoma, papillary cystoma, or superficial papilloma, even when the organ is apparently perfectly healthy. Gersung (Centralb. f. Gynäk., No. 5, '99).

In ovariectomy if the opposite ovary contains only a few retention-cysts it may be left after puncturing or resecting the cysts. If the cyst is of the true papillomatous variety the other ovary should always be removed, even if it appears to be perfectly healthy, since experience has shown that it often undergoes papillomatous degeneration afterward. This does not refer to cases in which small excrescences are found in the inner walls of retention or parovarian cysts. Commencing adenomatous degeneration of the opposite ovary may be suspected if the albuginea is much thickened and the organ is almost entirely transformed into large cysts with thick walls. In the case of young women a suspicious ovary may be split open, its interior examined, and, if healthy, may be sutured with catgut. If one ovary is affected with carcinoma, sarcoma, or endothelioma, the opposite one should always be extirpated. Theilhaber (Brit. Med. Jour., Jan. 28, '99).

Drainage.—The question of drainage is not considered as one of so great importance as a few years ago. Then it was the custom to drain in the majority of cases; now, to drain in a very slight minority. It is only in those patients in whom there is extensive tearing up of the peritoneum, with the probability of oozing or serous effusion, that the operator would consider it necessary to drain. Drainage may be accomplished by the introduction of a glass drainage-tube, which must be carefully attended to for the next forty-eight hours, or the use of gauze drain, which serves a useful purpose, in that it may be employed to compress a large bleeding surface. In cases in which there is large tearing up of the

peritoneal cavity, the plan advocated by Clark, of elevating the foot of the bed so that the fluid shall no longer be retained in the pelvis, where the peritoneum is most injured, but be thrown back into the peritoneal cavity, where it should come in contact with healthy peritoneum capable of absorbing it, is the method of procedure practiced in preference to drainage. It has received the name of postural drainage. This method of treatment has an advantage, also, in relieving the patient of much pain and discomfort, arising from the gravitation of fluid to the most dependent portion. The elevation of the injured part renders it more difficult for blood to be sent into it, and consequently the patient suffers less distress.

Closure of the Wound.—The principle of closing the wound is to bring and retain the various parts of the wound in their normal relation. This is effectively accomplished by employing both interrupted and continuous suture, introducing a continuous suture with catgut to close the peritoneum, then introducing a series of interrupted silk-worm-gut sutures which shall pass through the abdominal walls, and pick up the edge of the peritoneum. The placing of these sutures is followed by a continuous catgut suture uniting the aponeurosis of the wall. The tying of the interrupted sutures holds the surfaces in apposition, prevents the accumulation of fluid in any dead space, and permits the sutures to be tied only sufficiently tight to hold in apposition the surfaces.

Dressing.—After careful cleansing of the surface the wound dressing consists in placing a piece of gauze wet with 1 to 2000 bichloride solution around the sutures, and over this several layers of sterile gauze and cotton, which are held in place by tapes attached to pieces of

plaster and fastened on either side of the dressing; and, finally, a well-placed bandage.

After-treatment.—The patient is kept quiet in bed, carefully moved from side to side to render her detention less irksome. Until she recovers from the anæsthetic, she is given nothing by the mouth other than small quantities of hot water, concentrated beef-extracts, and at the end of twenty-four hours, in an ordinary case, may be given a cup of tea and a little soft toast. This is followed later with an egg, chewing some beefsteak, and at the end of the third day a light diet.

Any indication of accumulation of gas in the intestine is early relieved by the administration of an enema consisting of an ounce each of magnesia, glycerin, and water. This failing to afford relief, is followed by a large enema of soap-suds in which an ounce of turpentine beaten up with the yolk of a couple of eggs, and strained, or an ounce of tincture of asafetida may be substituted for the turpentine. Nausea and vomiting may be overcome by giving draughts of hot water, thus washing out the stomach; the administration of small doses, frequently repeated, of tincture of nuxvomica, or a combination of acetanilid and caffeine, or the use of oxalate of cerium. If the patient regurgitates small quantities of dark-greenish material, and this is continued in spite of the large draughts of hot water, the stomach-tube should be introduced and the stomach irrigated. The patient should be carefully watched during the operation by both nurse and physician to anticipate the appearance of complications or abnormal symptoms.

E. E. MONTGOMERY,
Philadelphia.

UTERUS, DISEASES OF.**Malformations.**

ABSENCE OF THE UTERUS.—The uterus is seldom entirely absent in the living being, a slight rudiment nearly always being found at the post-mortem examination, although it may not have been discovered during life.

RUDIMENTARY UTERUS.—The rudimentary uterus may be of any size from a cylinder-shaped body an inch long down to a slight thickening of tissue on the posterior surface of the bladder at the junction of the rudimentary Fallopian tubes. It is usually solid, although in rare instances it takes the shape of a membranous sac. One or both ovaries may be present, usually also in a rudimentary state. The vagina may be developed, but is ordinarily represented by a shallow, blind pouch. The vulva is apt to be normal in appearance.

About the end of the eighth week of foetal life Mueller's ducts begin to unite, the united lower portions forming the uterus and vagina, the upper ununited portions the Fallopian tubes. As a result of interference with the development during the process of union, which is complete at the end of the third month, various malformations have been found:

The **ONE-HORNED UTERUS** indicates an arrested development of one of Mueller's ducts. The organ is more or less fusiform in shape, and curves toward the corresponding Fallopian tube. The other side is usually represented by a rudimentary horn.

The **TWO-HORNED UTERUS** represents a want of perfect union of the ducts. The defect may involve the fundus only or may cause a flattening (uterus planifundus) or slight depression of the fundus, or it may extend downward any distance toward the cervix (uterus bicornis unicolis), or it may extend into the cervix

(uterus bicornis bicollis). Sometimes a septum divides the uterus (and sometimes the vagina) below the junction.

The **DOUBLE UTERUS** results when the union of Mueller's ducts does not take place above the vagina. The two sides are entirely distinct, but the vagina may be single or double or septate.

The **TWO-CHAMBERED UTERUS** is more or less normal in size and shape, but the septum persists, and may not extend as far down as the internal os (uterus subseptus), or it may divide the whole uterus and cervix, forming two cavities, or the septum may extend to the internal os only (uterus septus unicolis).

Symptoms and Diagnosis.—The symptoms do not usually attract attention until puberty or marriage, when dysmenorrhœa, amenorrhœa, sterility, dyspareunia, or the signs and symptoms of atresia of the vagina, with retention, develop.

The shape and size of the uterus is determined best by the bimanual recto-abdominal examination. If the vagina and cervix be well developed, the cervix can be pulled down within better reach by a vulsellum, and the character of the interior of the uterus may also be determined approximately by the sound.

If the diagnosis be difficult, it may be possible, with the aid of anæsthesia, to introduce a finger into the bladder; then the uterus, tubes, and ovaries can be palpated between it and a finger of the other hand in the rectum. When the uterus is rudimentary, slightly resisting cords, representing the Fallopian tubes, can be felt, which are joined at the site of the uterus on the posterior surface of the bladder and lead outward to the rudimentary ovaries, if such exist. If the uterus be one-horned, its fusiform shape can be palpated, extending laterally upward, and also the rudimentary horn

on the opposite side. The two-horned uterus is easily recognized by the depression in the fundus, and the double uterus by the presence of two elongated hard bodies merging together in the vagina below.

Treatment.—There is but little to do in the way of developing the organ or improving its shape, and irremediable symptoms may call for removal of the ovaries or uterus or both. Pregnancy in a rudimentary horn usually eventuates in rupture, and calls for a removal of the affected part.

After the complete union of Mueller's ducts the following deformities may result:—

FETAL UTERUS.—The foetal characteristics remain. The body is small and cylindrical, and may be solid. The cervix measures about one inch, and twice as long as the uterus. The papillary folds of the cervix extend throughout the cavity.

INFANTILE UTERUS.—The uterus remains about the same as at birth. The body is but little over half the length of the cervix. The vaginal portion of the cervix is short, and the vagina and external genitals are usually small.

PUERILE UTERUS.—Here the body is as long or a little longer than the cervix, and the external genitals small. The conditions previous to puberty persist.

PUERILE CERVIX.—The corpus is about normal in size, but the cervix is small and conical, with an extremely small external os. Antelexion and stenosis may be present.

The *symptoms* and *diagnosis* are the same as for deformities, resulting from imperfect union of Mueller's duct, and may be associated with those of atresia vaginæ, or stenosis of the cervix (*q. v.*).

The prognosis is unfavorable except for puerile cervix.

Treatment.—If treatment is commenced soon after puberty, some benefit may be derived from intra-uterine bipolar faradization and persistent periodical dilatation of the cervix. Divulsion by means of bladed dilators under anæsthesia, with packing of the uterus for thirty-six hours, may be followed by repeated packings, provided the endometrium is douched out each time with an efficient antiseptic; afterward the cervix may be kept dilated by conical round dilators twice weekly. Pelvic massage and movements adapted to develop the pelvic musculature and increase the flow of blood to the pelvis are sometimes used.

Stenosis of the Cervix.—Stenosis of the cervix consists in a lack of development or atrophy of the part sufficient to interfere with uterine drainage. The contraction may be at the external or internal os, or exceptionally throughout the canal, and is often connected with flexion of the uterus. It may be due to puerility in the nullipara, to cicatricial contraction following cervical laceration in the parous woman, and to atrophy in the senile woman.

SYMPTOMS.—Colicky dysmenorrhœa, as in cases of antelexion, lasting from a few hours to a day or two, is the most common symptom. Colicky pains in the vesical region are sometimes felt between the menstrual periods, and may be followed by a discharge of mucus, blood, or pus. In old people prolonged retention of secretions, which usually become offensive and purulent (senile endometritis), may take place and stretch the uterine walls until the organ resembles a bag. Endometritis with its symptoms is present in long-standing cases.

Sterility, which is often relieved by a dilatation of the cervix, is a common condition.

DIAGNOSIS.—If the stenosis is at the

external os, the orifice may be scarcely visible, or may look like a small dimple on the end of the cervix. If at the internal os a small uterine probe, or a piece of slippery-elm bark cut into the shape of a slender tent, will demonstrate the partial or complete closure of the canal. If the cervix be small and flexed, the stenosis is probably connected with imperfect development and displacement; but if the cervix be large and perhaps lacerated, the stenosis is due to induration and contraction of the mucous and submucous tissues at or near the internal os. In the latter case the internal os is apt to be quite sensitive to the touch of the sound, and may bleed a trifle upon the withdrawal of the latter. Thick cervical mucus will, as a rule, be visible.

PROGNOSIS.—A state of patency of the cervical canal can usually be obtained, but it is often difficult to maintain it in the virgin and the old woman without occasional dilatation. The sterility can usually be relieved in quite young people; but, after the condition has lasted long enough to produce hyperplasia or endometritis, the sterility is apt to persist. In married women with stenosis and sterility, who do not apply for several years for treatment, the sterility is seldom relieved by dilatation, whereas it often is in the young married woman who applies within a year or two of the date of her marriage.

TREATMENT.—In ordinary cases of partial stenosis presenting symptoms, and in young women with small cervix, dilatation with graded sounds twice weekly, the same as for urethral stricture, will cure stenosis of the *external* os in a short time. Stenosis of the internal os may require the dilatation twice weekly for three or four months, then once weekly for a year. The cervix is

not only dilated, but stimulated to increased development. Before each dilatation the patient should take a vaginal douche, and the vaginal fornices and endometrium should be disinfected with a 5-per-cent. carbolic-acid solution through the speculum by the physician, and the uterine cavity should be disinfected by tincture of iodine, ichthyol, etc.

In old cases the cervix will probably require forcible dilatation by bladed dilators as well as a curettage for the endometritis. The uterine cavity and cervix should be packed tightly for twenty-four hours after the operation, and the cervix be kept dilated by the passage of a large sound or bougie (size of a No. 18 urethral sound, American scale) two or three times monthly for several months.

Incision of the cervical canal is almost never required, except for cicatricial contraction or rigid ante flexion. In the latter case incision of the posterior wall of the cervix in the median line to the vaginal junction (Marion Sims) and a doubling in of the ends so as to obliterate the raw surfaces (E. C. Dudley) may render the cure of the stenosis of the internal os easier.

Literature of '97-'98-'99.

The following plastic operation on the cervix has been devised in order to prevent recurrence of the stenosis after division of the external os cervicis. It consists of the preparation of flaps from the vaginal aspect of the cervix and implantation of them in the angles of the wound made by the division. In this way union of the sides of the angle of the wound is prevented, and the remainder of the cut surfaces are held apart until cicatrization has occurred. A. Rosner (Centralb. f. Gyn., Feb. 27, '97).

Laceration of the Cervix.—Lacerations of the cervix are ordinarily produced by abnormal conditions and influences that

interfere with the natural course of labor, such as a proportionately-large head, a small or diseased cervix, malpresentation of the fœtus, premature rupture of the membranes, precipitate labor, artificial dilatation of the cervix, etc.

The unilateral and bilateral lacerations are the most common varieties, although posterior, anterior, multiple (stellate), diagonal, and annular lacerations occur. They may even extend into the vaginal vault.

SYMPTOMS AND DIAGNOSIS.—The symptoms are those of the inflammations and displacements. The fissures and flaps of the lacerated cervix can best be discovered by a digital examination, and by inspection with Sims's speculum. The bivalve speculum opens the fissures wide, and thus may deceive the eye as to their size or existence.

PATHOLOGY.—Many moderate lacerations heal by adhesion, although the majority of deep ones cicatrize and contract with a cicatricial plug in the angle. In quite a large proportion of cases mucous membrane seems to extend over the raw surfaces, and nothing abnormal but the fissure remains.

More or less infection of the wounds is apt to take place, with the consequent cervicitis, parametritis, perimetritis, and perhaps pelvic abscess. The infection may also spread to the cervical, corporeal, and tubal mucous membrane and to the ovary and pelvic peritoneum. As a result of the cervical endometritis, the mucous membrane becomes hyperplastic, and pushes the lower ends of the cervical flaps outward, producing eversion (ectropion). All varieties of cervical inflammation, erosion, and degeneration are found connected with and probably dependent for their origin upon the lacerations.

Retroversion and lateral displacements

of the cervix may result from the cicatricial contraction that attends those extending into the vaginal vault, and other displacements and fixations may result from peritonitis.

TREATMENT.—Extensive lacerations should be sutured immediately after labor if the conditions are favorable. The cervix should be carefully pulled down to the vulva by means of a vulsellum, the shreds of tissue trimmed from the lacerated edges, and the wound-surfaces be united in their original relation to each other by hardened catgut sutures. If there is any doubt about the possibility of subsequent cleanliness, silk-worm-gut sutures, which will hold better, will give better results.

Old lacerations may require a few applications of carbolic acid, or other disinfectant and astringent, to the eroded and hyperplastic mucous membrane, for the diseased surface can be much better treated before being turned into the cervix than after. To close the laceration before curing the cervical endometritis often results in making the symptoms worse.

Emmel's Operation.—A tenaculum is hooked into the lower, or distal, end of the cervix at one side of the fissure and the mucous or cicatricial surface of the latter cut off, commencing under the tenaculum and going up into the angle and beyond the cicatricial plug. The other side of the fissure may then be denuded from the angle down, or from below upward as on the first side. If the laceration is bilateral, the fissure on the other side is similarly denuded, and then both wounds are sutured with hardened catgut or silk-worm gut. It is well to place the first suture at the distal end of the flaps in order to insure symmetry. Two-per-cent.-carbolic-acid douches used twice daily keep the catgut hard and

clean for a considerable time, and has a disinfectant action.

When the lacerations are bilateral or multiple and extensive, and the cervical follicles extensively diseased, it is not worth while to spend several months in an attempt at cure, for Schroeder's operation will remove the diseased mucous membrane and restore the shape of the part.

Schroeder's operation consists in lateral incisions through the cervix, or cicatricial plugs, on both sides as high up as may be necessary to expose all of the diseased cervical mucous membrane. The sides of the tears are denuded from these incisions down to the end of the cervix. Instead, now, of sewing up the parts, as in Emmet's method, the mucous membrane is dissected off between lines drawn across from the upper and lower ends of the raw lateral surfaces. The lower ends of the cervical flaps are then folded in until the mucous membrane of the vaginal portion reaches that of the cervical cavity above the denudation, and are sutured to it. Then the wounds left on either side are trimmed, if necessary, and sutured so as to close the lateral fissures.

Before closing the cervix it is better to curette the uterus, thoroughly, if there be endometritis, and gently (for cleanliness), if there be none, and apply carbolic acid or tincture of iodine to the endometrium.

Displacement of the Uterus.—The uterus is normally located in the central and anterior portions of the pelvis. The cervix is suspended by the pelvic connective tissue (pubo-uterine, sacro-uterine, and broad ligaments) just behind and often a trifle to the left of the axis of the pelvic cavity. Its range of mobility is small. The corpus leans over the bladder in slight ante flexion, the flexure

varying with the fullness of the bladder and rectum. The former, when it becomes distended, lifts the fundus and straightens the uterus, while the latter, when loaded with fæces, pushes the cervix forward and thereby increases the flexion.

The main factors which determine malposition are variations in the relative development of the pelvic organs and contiguous connective tissue, and in injuries or other factors that diminish, destroy, or modify the connective-tissue support. Alterations in the uterus from pathological conditions constitute another, although less important, cause.

Etiology.—When the uterus is poorly developed, or is developed late, the connective tissue about the rectum and vagina have relatively more than normal supporting power, and the uterus may be held up at the pelvic brim in a position called *elevation*. This is the position of the rudimentary and fœtal uterus. Or the uterus may be held forward by the abundant connective tissue at the base of the bladder in a position called *ante-position*. This is often the position of the puerile uterus. An imperfectly-developed vagina aids in maintaining this form of displacement. As the corpus uteri and pelvis grow, the connective tissue of the broad and sacro-uterine ligaments may, as the result of constipation, debility, hard work, etc., be wanting in tone and fail to support the cervix firmly. Then, when the uterus is pushed backward by the distended bladder, the round ligaments, which nearly always share the flabby and immature nature of the corpus, do not draw the fundus forward over the collapsing bladder, and the abdominal pressure may turn the temporarily retroposed organ back into *retroversion*, or, if the connective tissue about the cervix is firm enough to hold it in

position, bend the corpus backward, producing *retroflexion*.

When, however, the sacro-uterine connective-tissue folds are normally strong, they draw the upper part of the cervix backward, so that retroversion cannot occur, while a short, imperfectly-developed foetal vagina may pull the vaginal portion forward and give rise to a *congenital antelexion*. The corpus is small, and the cervix may be elongated by the traction of the vagina.

When the vagina is well developed, the anterior wall is two and one-half inches long and the bladder connective tissue does not draw the cervix too far forward. In such cases, if the uterus develops late or remains small in an otherwise-vigorous girl, the cervix is apt to be drawn by the vigorous sacro-uterine folds backward and upward nearer the rectum and sacrum than normal, while the fundus is drawn by gravity, and pushed by abdominal pressure, downward in front of the cervix and becomes more than normally bent or antelexed. Some atrophy and shortening of the anterior uterine wall is likely to take place, because the filling bladder does not lift the fundus sufficiently to straighten the corpus, nor is the dorsal position — which under normal conditions would tend to bring the fundus backward — able to do so. The flexion then becomes *permanent*, or *irreducible*.

Thus it will be seen that many of the displacements of the uterus are errors in development due to the inheritance of an imperfect *physique*, or to modes of living in early life that fail to insure symmetrical development.

The mechanism bringing about retroversion of the uterus is very complicated. There are congenital defects, such as an abnormally-long cervix or an unnaturally short vagina, distension of the bladder, impaction of faeces in the

rectum extending up above the ampulla, imperfection of the pelvic floor, inflammatory changes in the uterine supports, and (most frequently) relaxation of the vaginal outlet. These causes may all be found in operation. In the presence of any one of them a weak point is produced upon which intra-abdominal pressure acts, and so leads, in the long run, to retroversion or retroflexion. In treatment, therefore, it is not sufficient to replace a uterus, for the tonicity of the tissues has been lost. Hunter Robb (Columbus Med. Jour., Sept. 29, '96).

After puberty congestion and inflammations of the uterus and neighboring structures modify or perpetuate these conditions. Thus, a hardening or rigidity of the uterine tissue from hyperplasia may render the flexion permanent, or irreducible. As a result of the increased weight, and of relaxation in the sacro-uterine tissues, the cervix may be carried by abdominal pressure toward the vaginal outlet, and we would have *ante-position*. If the antelexion is a permanent one, we have both antelexion and ante-position; or if the sacro-uterine ligaments are greatly relaxed, the body of the uterus is tipped backward by the bladder and abdominal pressure and we have both *antelexion* and *retroversion*. If the uterine rigidity takes place as the result of puerperal metritis in an organ that had been antelexed, the flexion may be prevented from returning, and the corpus will tip forward without bending in the position called *anterversion*.

General relaxation of the pelvic connective tissue due to pelvic disease, general debility, and increased intra-abdominal pressure from ascites or tumors allows the uterus to descend to the vaginal outlet, either with the uterine long axis in coincidence with the pelvic axis, constituting *prolapse*, or with the fundus lying in the *cul-de-sac* of Douglas, constituting prolapse and retroversion.

Injury, overstretching, laceration, and subsequent cicatricial contractions may, as they affect different parts, allow the cervix to sink toward the vaginal outlet, or draw the cervix from its normal location and cause the above-mentioned displacements in a previously-normal uterus.

Literature of '97-'98-'99.

Notes collected of 2132 cases personally examined, and in which pelvic or abdominal displacements existed. There were found 1089 with displacement of pelvic organs, or 52 per cent.; 1023 with displacement of abdominal viscera without any displacement of pelvic viscera, or 48 per cent.; and 134 cases of displaced pelvic viscera *without* displacement of abdominal viscera, or 6 per cent. Floating kidney occurred in 357 cases, or 17 per cent. J. H. Kellogg (Med. News, Dec. 18, '97).

Inflammation and exudates of the pelvic organs and pelvic peritoneum may fix the uterus in its malposition, or may push or draw it from a normal to an abnormal location. *Lateral positions or versions* are usually caused in this way, and often the posterior deviations.

The same conditions that cause prolapse may be followed by a partial or complete *protrusion* of the uterus through the vulva. When the conditions are those of relaxation the cervix protrudes first, and inverts the vagina. This is the mechanism in the virgin and nullipara. When protrusion results from lacerations about the vaginal outlet, the vagina appears first at the vulva, dragging the uterus after it. The bladder protrudes with the uterus, and occasionally the rectum.

When the uterus is fixed in the pelvis by adhesions the traction of the vagina upon the cervix is apt to produce elongation, and some hyperplasia, of the cervix, and only moderate descent of the fundus,

thus giving rise to *prolapse*, or *protrusion*, of the cervix.

The uterine displacements which are of sufficient importance to require separate considerations are *anteflexion*, *anteversion*, *retroflexion*, *retroversion*, *prolapse*, and *inversion*.

Anteflexion and Anteversion.

Symptoms.—The most common symptom of anteflexion is dysmenorrhœa, due to interference with the drainage and circulation of the uterus. The pain may commence with the first menstrual period or not until some years later. It is a cramping pain in the lower abdomen felt about the time the menstrual discharge appears, and if there be no complication ceases when the flow becomes well established: *i.e.*, from one to several hours. As, however, more or less uterine and ovarian congestion and hyperplasia gradually supervene, the pain, after a time, lasts longer and becomes more continuous. Soreness in the lower abdomen, iliac and lumbo-sacral regions may then persist throughout. Between the periods the symptoms are those of hyperplasia or endometritis.

In retroversion backache and the other symptoms of the inflammatory conditions that have caused the misplacement are present.

Diagnosis.—The diagnosis is made by the bimanual examination. When the uterus is in the front part of the pelvis, the fundus, which is often small, is felt over the anterior vaginal wall and the cervix turned toward the perineal body.

When the uterus is retroposed, as is usually the case when the parts are well developed, the cervico-vaginal junction will be found well back in the pelvis, making an acute, instead of the normal right, angle anteriorly. With the tip of the index finger touching the junction of the cervix with the anterior vaginal

wall, the subpubic arch should normally be against the finger at or beyond the middle of the third phalanx (over two and one-half inches). The posterior fornix is unusually deep, and the posterior surface of the cervix may be felt to be convex in its long diameter. The angle of the anterior uterine wall formed just above the vaginal junction can usually be felt and sometimes the fundus itself. If necessary, a sound may be passed to locate the uterine cavity and to differentiate between a tumor or an exudate that might be mistaken for the uterine body.

In anteversion the anterior vaginal wall is about three inches long as measured on the finger, but the os uteri is still farther back, and points toward the coccyx or sacrum. The cervix extends backward, and the corpus forward over the anterior vaginal wall, and is in a straight line with the cervix. The organ is usually larger and harder than normal.

Treatment.—The treatment of ante-flexion sufficient to cause symptoms should be a systematic dilatation of the cervix with graded conical sounds, or by rapid dilatation.

If the latter treatment is used, the dilatation should be maintained by means of the occasional passage of a large sound under the strictest antiseptic precautions. The endometritis may require treatment, or measures may be indicated such as are recommended elsewhere for treatment of puerile uterus.

Enteroptosis, or Clénard's disease, may set up uterine ante-flexion and all its consequences. Such being the causation of the displacement, a treatment is recommended giving tone to the uterus and other involuntary muscular organs (for example, electricity, massage, etc.), along with the dilatation of the cervix with Hegar's bougies, and the replace-

ment of the ante-flexed fundus. Pecker (*Arch. Prov. de Chir.*, Nov., '96).

Retroflexion and Retroversion.

Symptoms.—These, like other uterine displacements, cause no symptoms unless connected with inflammation or its products, or unless they interfere with the menstrual flow or with the uterine circulation. Many cases have no symptoms. When dysmenorrhœa is present, it often commences with cramping pains in the lower abdomen, as in ante-flexion, but the pains do not usually cease as soon as the flow begins, and may continue throughout. Backache is a common symptom, and is apt to be increased during the period. The traction upon the base of the bladder occasionally causes persistent vesical irritability. Symptoms of pelvic inflammation are often present.

Literature of '97-'98-'99.

Three hundred women were examined from two to ten months after delivery, and the uterus was found retrodisplaced in 36, or 12 per cent. Eleven had no symptoms, while in the remaining 25 the symptoms were due to complications other than the displacement in all but 4. Ninety others under treatment for retroversion were carefully observed with the view of determining how far their symptoms were due to this condition alone, with the result that in 84 other complications existed (pregnancy, menorrhagia, prolapsus, disease of the adnexa and perimetrial tissues) which were the real causes of their sufferings. The conclusion is reached that the symptoms usually ascribed to retroflexion—dysmenorrhœa, menorrhagia, sterility, and tendency to abortion—are more often due to complications than to the displacement itself. Winter (*Centralb. f. Gyn.*, No. 25, '97).

Diagnosis.—In retroversion the cervix is within two inches of the vaginal entrance and points toward the pubes, while the body can be felt to extend nearly

straight backward into the hollow of the sacrum. In retroflexion the angle formed by the posterior walls of the cervix and corpus can be felt, and the body of the uterus is in or over the *cul-de-sac* of Douglas. In order to avoid mistaking the corpus uteri for a tumor or exudate, the absence of the former from its normal position can be readily demonstrated bimanually. If necessary, a sound may be introduced.

Treatment.—If adhesions are present with exudate or diseased ovaries, these should be treated. Pelvic massage, forcible separation (Schultze), or peritoneal section may be required. Interference of the flexion with drainage may necessitate forcible dilation, and the endometritis may also call for appropriate treatment.

If, after the pathological conditions have been as far as possible corrected, the patient still suffers, the uterus should be replaced and kept in position by a pessary or by an operation. Replacement of the uterus may be accomplished as follows: With two fingers in the vagina push the cervix and posterior vaginal wall backward, and press the other hand from above into the pelvis just below the promontory of the sacrum, and push the fundus, which is raised by the backward pressure against the cervix, forward to the pubes. If this cannot be done, two fingers in the rectum may be made to push the fundus up out of the hollow of the sacrum so that the hand on the abdomen may pull it forward over the pubes. By attempting these manœuvres in the genu-pectoral position the weight of the uterus and abdominal organs may be made to assist. Küstner draws the cervix down toward the vulva with a vulsellum until the fundus is drawn out of the *cul-de-sac* of Douglas, and then turns the handle of the instrument up toward

the pubes externally and pushes the cervix back toward the sacrum where the fundus had lain.

Pessaries.—After the uterus has been replaced it may be held in position for a few months by a pessary. The retroversion will usually recur when the pessary is removed, but the symptoms may not.

The Albert Smith or Emmet or Thomas modifications of Hodge are the best forms. They are introduced with the short curve turning upward behind the uterus.

Literature of '97-'98-'99.

In the treatment of retroversion of the uterus the modified Hodge pessary is used almost exclusively personally. The criterion by which one can judge whether a pessary has accomplished its purpose is, first, it should maintain the uterus in its normal position without undue pressure; and, second, it should cause the patient no discomfort. The patient must be kept under observation, and the vagina examined at the expiration of one week, even if the patient feels perfectly comfortable; and, if too much pressure is being exerted at any point, the instrument must be removed and corrected. Fritsche, of Halle, has declared that he considered it easier to perform a laparotomy than to apply a pessary. The uterus must be brought into the normal position; then—and not till then—should a pessary be applied. William Mercer Sprigg (*Amer. Jour. of Obstet. and Dis. of Women*, Dec., '98).

Fine, sterilized lambs' wool is excellent, on account of its elasticity, in the mechanical treatment of displacements of the uterus. These tampons should be used almost continuously. By the use of some antiseptic powder, such as boric acid, the tampon can be worn forty-eight hours. The Albert Smith and Emmet pessaries are also valuable in uterine displacements. The principle of the action of the pessary is to keep the cervix in or near its normal position, about one inch from the sacrum, and the external os is about two and one-half inches below the sacral promontory. The length,

width, and amount of curvature of pessary would be adapted to each individual case. T. J. Watkins (*Amer. Gynæc. and Obstet. Jour.*, Mar., '99).

Operations.—When pessaries fail to relieve the symptoms, operations are indicated. If the uterus can be perfectly replaced and the fundus remains near the anterior vaginal wall after being released, and the parametrium feels soft, Alexander's operation or shortening the round ligaments through the inguinal canal may be depended upon to hold the organ in position. If there are adhesions to be separated or ovaries to be resected, or if the uterus immediately assumes its old position of retroversion after having been replaced, a vaginal or abdominal incision into the peritoneal cavity should be made and the round ligaments shortened through that opening. A suture of the uterus forward should, as a rule, be accompanied by a taking in of the slack of the round ligaments. The latter and slight peritoneal adhesions of the fundus to the peritoneum over the bladder by means of catgut sutures is all that is ordinarily required.

Prolapse and Procidentia.

Symptoms.—Backache, dragging sensations about the pelvic outlet, and difficulty in urinating and defecating are common symptoms. In procidentia, ulceration of the protruding vagina or cervix, cystitis, and urethritis may be troublesome. Leucorrhœa and other symptoms of metritis, as well as those of neurasthenia, debility, indigestion, etc., complicate many cases.

The frequency of urinary incontinence in the early stages of prolapsus uteri emphasized. The incontinence may be true or false, with or without pain, but it is always manifested in the upright posture, is exaggerated by strain or fatigue, and it usually disappears when the woman lies down. It appears to be

always due to a urethral lesion. Boursier (*Annales de Gyn. et d'Obstet.*, Oct., '96).

Diagnosis.—In prolapse the cervix will be found near or at the vaginal entrance, with or without a protrusion of the anterior or posterior vaginal wall or both (anterior and posterior colpocele), carrying, perhaps, the bladder (cystocele) or rectum (rectocele) with it. A recto-abdominal, bimanual examination reveals the fundus either in the *cul-de-sac* of Douglas or low down behind the pubes.

In protrusion the cervix uteri can be seen, and will admit the uterine sound. Rectal palpation reveals the absence of the uterus from the pelvis, and perhaps the projection of the anterior rectal wall into the vulvar tumor. A catheter introduced through the urethra will show whether the bladder is up behind the pubes or external to the vulva. In complete procidentia its posterior wall nearly always follows the cervix out of the pelvis.

The parts can be pushed back into the pelvis and be palpated in their normal relationship.

In case the cervix only is prolapsed and elongated the uterine sound will usually penetrate four or more inches. The rectal examinations inform us that the fundus is only moderately prolapsed, while the cervix is long and thin. When the elongation is just above the level of the anterior vaginal junction, the anterior vaginal wall comes down with the cervix and the posterior vaginal fornix retains more or less of its depth. When the elongation is in the upper part of the cervix above the posterior vaginal junction, the posterior fornix descends. When both of the fornices remain deep it is mainly the vaginal portion of the cervix that is elongated, usually hypertrophied.

Treatment.—Operative treatment is, as a rule, necessary for the cure of prolapse. However, in many cases of prolapse and protrusion without distressing symptoms the patient may prefer palliative measures. Pelvic massage will often produce a partial cure (Thure Brandt's technique).

The patient can ordinarily push the parts back and retain them during the day-time by introducing large cotton or wool tampons, or a rubber inflatable bag, and inflating it. A soft-rubber elastic ring-pessary can sometimes be introduced by the patient every morning and removed every night. Soft-rubber pessaries should never be worn continuously. A hard-rubber or 'large Albert Smith pessary can be worn continuously with great comfort in some cases. The prolapse returns when the pessary is removed.

Operations.—When the prolapse is the result of lacerations during childbirth it is usually necessary to curette the enlarged subinvolved uterus, repair the laceration or amputate the enlarged cervix, perform anterior and posterior colpotomy and perineorrhaphy, as well as remove any hæmorrhoids or protruding anal folds. If the fundus uteri sinks into the hollow of the sacrum as the cervix is pushed within the pelvis, it is best to perform Alexander's operation and thus turn the fundus forward behind the pubes. When the fundus is allowed to remain in the posterior *cul-de-sac*, the cervix points forward and acts as a wedge to force the vulva open. In case the patient is at the change of life, vaginal fixation, or uniting the anterior wall of the uterus to the anterior vaginal wall, may be employed to accomplish the same purpose.

In extreme cases the uterus has been removed by abdominal hysterectomy and

the stumps attached to the abdominal wall. Vaginal hysterectomy supplemented by a narrowing of the vagina and perineorrhaphy has also proved successful.

Inversion of the Uterus.—Inversion signifies a turning of the corpus uteri into the cervix (partial) or through it (complete). The uterus turns inside out. It only occurs when the uterus is (1) enlarged and (2) partly or completely relaxed. These conditions are found in the puerperal state and during the presence of polypoid or submucous uterine tumors (usually myomas).

The CAUSES in the puerperal state are pressure upon the fundus uteri or traction upon the umbilical cord, or both, during the third stage of labor. Adherent placenta and a short umbilical cord are favorable to its occurrence. After a partial inversion has taken place, abdominal pressure may complete it, or the projecting fundus or tumor may be caught in the cervix and be expelled into the vagina by the contractions above it.

Symptoms and Diagnosis.—Sudden complete inversion occurring during labor is often accompanied by fatal hæmorrhage unless immediate reduction is effected. If the patient escapes death by hæmorrhage, septicæmia is apt to follow later.

More often the onset is gradual and hæmorrhage is more or less continuous and abundant. Leucorrhœa and metrorrhagia, with the symptoms of metritis, anæmia, and nervous exhaustion, constitute the chief subjective evidences of the disease.

An inverted uterus may be differentiated from a fibroid polypus by the following signs:—

The inverted uterus in recent cases is darker, softer, and more sensitive, and the cervix is represented by a shallow

depression all the way around. A fibroid can be twisted slightly without carrying the cervical rim with it. The cervical rim can, in some cases, be made to disappear by means of traction exerted upon the fundus, completely inverting the entire organ. The orifices of the Fallopian can sometimes be detected and the relations of the parts be thus determined.

Bimanual recto-abdominal examination demonstrates the absence of the fundus from the pelvis, the presence of a cup-shaped depression, and in old cases the presence of the ovaries at the edges of the depression.

When the uterus is completely inverted by a polypus, the deviation of the polypus from the size, symmetry, and evenness of surface of the uterine body, and a depression at the level of the attachment may aid us in discovering the character of the tissues. A shallow incision, which can be quickly sutured, will reveal the structure of the tumor and the existence of a capsule.

Anatomy and Pathology.—The fundus may be (1) merely indented, or (2) the entire corpus may project through the cervix, or (3) the cervix and corpus may be completely inverted, like a bag turned inside out. The first and third conditions exist, as a rule, only temporarily and while traction upon the corpus is being made; hence the second one constitutes the type.

Before involution has taken place the peritoneal cup within the cervix is large and contains the Fallopian tubes and ovaries. Right after labor the fundus projects into the vagina as a large, soft, purplish, spongy mass. This gradually becomes smaller and harder and smoother as involution progresses. The discharge, at first bloody, soon becomes a bloody mucus, and the membrane assumes the characteristics of hyperplasia.

After involution the body becomes hard and pear-shaped, and the ovaries and tubes are no longer contained in the peritoneal cup. The mucous membranes undergo atrophy, although in places glandular pockets dip into the mucous membrane. Gangrene of the fundus is a possible, although extremely rare, occurrence.

Prognosis.—Hæmorrhage, local discomfort, leucorrhœa, etc., may lead to profound anæmia and depression, and finally to exhaustion. In the puerperal state immediate death from hæmorrhage or inflammation, or perhaps death later from sepsis, may take place.

Treatment.—Immediately after labor the knuckles should be pushed steadily against the projecting mass until it recedes through the relaxed cervix. Then (but not until then) measures should be used to contract the uterus, such as ergot hypodermically, judicious massage over the fundus, or—if necessary—a hot intra-uterine douche or antiseptic gauze packing.

In recent cases beyond the puerperium taxis may suffice. Prolonged traction upon the cervix with a vulsellum combined with attempts to enlarge the cervical ring by eccentric pressure, and compression of the corpus uteri with the hands or padded forceps may be followed by an attempt to indent one of the horns by the fingers formed into a cone, while the traction is being kept up.

Counter-pressure by means of the index fingers introduced into the bladder and rectum, respectively, while the thumbs in the vagina press against the fundus, has proved successful in two or three cases.

In older cases the *gradual method* is the best. The fundus is pushed back toward the sacrum, and a rubber bag is introduced between it and the coccyx and sa-

crum, and inflated. Elastic continuous pressure is thus made toward the pelvic brim and the resistance of the uterine tissue is gradually overcome. The vagina is thoroughly douched before each introduction of the bag, which is taken out and cleaned every forty-eight hours. Two or three days or as many weeks may be required for the reduction.

Literature of '97-'98-'99.

A chronically-inverted uterus may be replaced as follows: After wrapping the uterus in gauze it is drawn down to the vaginal outlet. The anterior wall is then divided in the middle line through the peritoneal lining, from the external os to the middle of the body. The fundus is pressed upward into the vagina through the wound and the latter closed with deep catgut sutures from fundus to the internal os. Now one lip of the cervix is seized by means of a vulsellum and the uterine body is pressed upward through the cervical stricture. The cervical wound is now sutured and the uterine cavity packed with iodoform gauze. Kehrer (*Centralb. f. Gyn.*, vol. xxii, No. 12, '98).

When all other methods fail, an operation will usually succeed. The posterior uterine wall may be incised longitudinally in the median line, and the cervix stretched by means of dilators introduced into the peritoneal cup through the incision. If the constriction ring dilates sufficiently, the incision is sutured and the fundus pushed up through the dilated parts (B. Bernard Brown).

In case the cervix does not yield to the dilators, the incision can be lengthened until it extends from the fundus through the cervix into the posterior vaginal wall. At its extremity a transverse incision is made across the posterior vaginal fornix into the *cul-de-sac* of Douglas, and the uterus is easily turned right side out and sutured in the vagina.

Then the fundus is pushed through the posterior vaginal opening and up into its proper position (Küstner).

On account of the liability to the occurrence of retroversion with adhesions after the posterior incision, it is preferable to similarly incise the anterior uterine and vaginal walls, separate the bladder, open the peritoneal cavity, restore the uterus to its normal shape, suture the uterine incision, and attach the fundus over the bladder, and—if necessary—shorten the round ligaments intra-peritoneally, before finally closing the vaginal incision.

T. G. Thomas recommended opening the abdomen and dilating the cervix from the peritoneal side. When this fails Everke incises the posterior cervical wall, and—if necessary—the anterior, reduces the displacement, and then sutures the uterine wound.

Tuberculosis of the Uterus.—CORPUS.
—Tuberculosis of the uterus may be caused, primarily, by tuberculous semen, instrumental inoculation, etc., but is nearly always secondary to tuberculosis in other parts. Although in the corpus it may exist in any stage, the miliary form is not recognizable clinically, and hence the ulcerative stage is the one usually encountered. The disease commences as small miliary tubercles, usually near the fundus, and spreads diffusely throughout the mucous membrane. In a few instances it develops in the uterine wall, constituting the interstitial form.

Symptoms and Diagnosis.—The early symptoms are those of endometritis, sometimes with menorrhagia. Later the uterine walls are thickened, and there is a grumous discharge containing cheesy particles. The menses are then apt to be scanty.

The diagnosis may be based upon a mi-

microscopical examination of uterine scrapings or inoculation of a guinea-pig. The presence of tubercles in other organs, the absence of foul-smelling watery discharges, and the slow progress distinguish it from cancer or sarcoma of the endometrium.

Treatment.—The uterus and appendages should be extirpated *per vaginam* unless the condition is secondary to advanced tuberculosis elsewhere. If the appendages are palpably affected, or if there be encysted tubercular peritonitis, the abdominal method is preferable.

In case an hysterectomy is contra-indicated, a curettage and package of the uterine cavity with iodoform might retard the progress of the disease.

CERVIX.—Tuberculosis of the cervix consists of a round-cell infiltration of the subepithelial structures, containing tubercular nodules. The glands over the affected portions show epithelial proliferation and sometimes form papillary masses. The vaginal portion is somewhat enlarged, nodular, and partly covered by a circular granular wound that gives off a sticky, grumous discharge.

The *symptoms* are at first those of cervical endometritis. Later the grumous discharge, containing glandular matter, the local pain, and the microscopical evidences obtained from a piece of excised tissue serve to establish a diagnosis.

The *prognosis* is usually bad because of the existence of the disease elsewhere in the system. If discovered early, the area of localization can be extirpated and the infection eradicated.

Treatment.—In the early stages a high amputation of the cervix may be depended upon unless uterine scrapings show signs of tuberculosis or decided inflammatory changes in the endometrium. If the vaginal fornices are affected, the vaginal wall should be excised well be-

yond the disease and the wound be strewn with iodoform powder and sutured.

Tumors of the Uterus.

Myoma of the Uterus.—Uterine myoma consists of one or more masses of fibromyomatous tissue developed in or upon the uterine walls. According to their location they are called polypoid, submucous, intramural, subserous, pediculated, and intraligamentous.

The polypoid tumor develops near or just under the mucous membrane, and, as it grows larger, projects into the uterine cavity. It remains attached by the mucous membrane and a few connective-tissue fibres, which form a pedicle of greater or less size and density, according to the amount of fibrous tissue dragged with it from the uterine wall. The submucous starts a short distance from the mucous membrane and projects more or less upon the surface. The uterine cavity in these two varieties enlarges as the tumor grows. The intramural develops well within the uterine wall and retains a thick covering of uterine fibres. The uterine cavity enlarges in proportion to the relation of the tumor to the mucosa. The subperitoneal variety is developed near the peritoneal covering, and causes a projection upon the serous surface without increasing to a great extent the size of the uterine cavity. The pediculated tumor develops just under the peritoneum and projects from the surface. The intraligamentous tumor projects into the connective tissue of the broad or sacro-uterine ligaments. From 5 to 10 per cent. develop in the cervix. Myomas may be single or multiple, each with a capsule, or several masses may be developed in one capsule.

Symptoms.—In the polypoid, submucous, and interstitial varieties menorrhagia and metrorrhagia are the most prominent symptoms, with or without mucous

or watery uterine discharges between. The menopause may be delayed beyond the fiftieth year. Such tumors may be accompanied by painful uterine contractions either from pressure of the polypus upon the cervix (acting like a foreign body in the uterus) or from obstruction of the cervix by the projection of a tumor growing near the cervix. The interstitial and submucous varieties may cause ovarian hyperplasia with its symptoms; or painful pressure upon the rectum, bladder, or pelvic nerves; or even obstruction of one or both ureters.

Sterility, early abortion, and dystocia are apt to be present. Anæmia is a common result of the loss of blood.

In a number of cases of myoma of the uterus sterility was present during the first five years after marriage, before a myomatous tumor could be detected. It is only exceptionally that the direct influence of the presence of the tumor in producing sterility can be proved. Hofmeier (Berl. klin. Woch., No. 43, '96).

Literature of '97-'98-'99.

Fibromyomatous tumors distinctly predispose to sterility. More than one-third of the patients having these tumors have during their married life but one child, while in a series of 2000 cases of women who had other pelvic diseases, but 5 per cent. show the same comparative sterility. Interstitial tumors have the greatest influence in preventing conception. Next in importance are subserous, while least effective are submucous. Fränkel (Monats. f. Geburts. u. Gyn., B. 8, H. 2, '98).

The subperitoneal and intraligamentous growths have but few symptoms until large enough to press upon the surrounding organs, when they cause pelvic pain, vesical and rectal distress, constipation, and, in rare instances, serious impaction of fæces in the colon.

Diagnosis.—*Single intramural, submucous, and polypoid myomata* enlarge the

uterus symmetrically, and must be differentiated from pregnancy, hæmatometra, flexions, carcinoma, sarcoma, and subinvolution. The introduction of the sound when pregnancy is excluded, and, in case of large tumors, the introduction of the finger, reveals the increased size of the cavity and perhaps the presence of a polypoid or sessile growth. In case of flexion the sound passes directly into the supposed tumor instead of over or behind it. The signs and symptoms of the above-mentioned conditions should be looked for.

Intramural multiple myomas produce a characteristic irregular enlargement and hardening of the uterus, with long, irregular cavity that is difficult to sound. Adherent ovarian tumor or inflamed appendages simulate fibroid enlargement, but are connected with a history of inflammation, with a congested or hyperplastic cervix, tenderness, and a sulcus between the uterus and the projecting mass. The uterine cavity may be but slightly enlarged. A myoma of the vaginal portion gives the os a crescentic shape, with flattening of the opposite lip. Carcinoma does not thus alter the shape of the os, is harder, and, if ulcerated, is excavated and fissured, instead of being merely eroded. The tenaculum holds firmly in the fibroid, while it tears out of cancerous tissue easily and causes free bleeding.

Very large soft myomas or cystomyomas of the corpus cannot always be satisfactorily diagnosed. The myoma usually draws up and immobilizes the cervix, and the uterine cavity admits the sound farther than normal. The uterine body can be palpated, and vascular murmurs can be heard over the sides of the tumor. Slow growth is characteristic of uterine myomas and ovarian dermoids.

Etiology.—They are supposed to de-

velop from the walls of the blood-vessels. Vascularity in connection with micro-parasitic development would seem to be in line with the tendency of recent discoveries in bacteriology.

Pathology.—The young tumor is composed of fibrous and muscular tissue irregularly interlaced, which develops in different proportions in different growths. It presents a whitish or yellowish-white, glistening surface, unless an unusual amount of muscular tissue is present, when it will be pinkish. The submucous and polypoid tumors retain some of the glandular structure of the mucosa, while a variety called adenomyoma is partly composed of glandular structure, and when cut presents the appearance of a coarse net-work of fibres, instead of the ordinary smooth sheen.

As they develop they usually deviate somewhat from the type. Those which are surrounded by anæmic tissue, as the multiple and subserous, grow slowly and become hard and fibrous and sometimes calcareous. Those which are surrounded by vascular tissue, as in the single intramural and submucous, grow comparatively fast, but, being poorly supplied with blood-vessels in their interior substance, are apt to undergo œdematous, myxomatous, cystic, and fatty changes. Sarcomatous and carcinomatous transformation may also take place. The hard tumors seldom grow very large, the soft ones often do, while the cystic may even destroy life by their great size.

Literature of '97-'98-'99.

All cases of so-called carcinomatous degeneration of fibromyomata uteri are, in reality, simply secondary carcinomatous infiltration of the tumor from primarily-diseased endometrium. Rodemacher (*Centralb. f. Gyn.*, No. 41, '97).

Of 77 fibromyomata of the uterus examined, the majority of which were of the subserous variety, glandular ele-

ments were found in only a single case; hence it is concluded that uterine adenomyoma is very rare. Ivanoff (*La Gynéc.*, Dec. 15, '98).

In studying the vascular supply of the uterine muscle by means of injections, small bloodless foci (*ilots*) were found, which seemed to increase in size at the expense of the surrounding muscular fibres. Around the minute myomata were zones of vascular tissue, which evidently served to nourish them. In the centre of the nodule could often be seen what appeared to be the lumen of a blood-vessel which had not been reached by the injecting fluid. These myomata grow first centripetally, then horizontally.

It is probable that uterine fibromyomata represent a localized hypertrophy of the tissue in the neighborhood of certain vessels, or the isolation of vascular areas due to thrombosis, prolonged pressure, or other circulatory disturbance. Keiffer (*Soc. Belge d'Anat. Path.*; *La Gynéc.*, Feb. 15, '99).

Prognosis.—On account of their slow growth and a tendency to stop growing after the menopause, they may run a comparatively benign course; yet in young people the persistence of the hæmorrhages and gradual growth may seriously impair the health before the advent of the delayed menopause.

Literature of '97-'98-'99.

The prognosis in the great majority of cases of uterine fibroids is good in as far as life is concerned, providing the growth does not begin too early in life, and grow so large as to cause death by pressure, or in the submucous or interstitial varieties does not cause death by oft-repeated hæmorrhages, or by some malignant or cystic degeneration taking place in the tumor. T. Fitzgibbon (*Jour. Amer. Med. Assoc.*, Aug. 19, '99).

Treatment.—The best treatment for growing myomas in women under thirty-five years of age is removal (enucleation) of the tumor, with preservation of the

uterus, if possible, otherwise by hysterectomy with preservation of the cervix and ovaries. Removal of the ovaries for fibroids is now almost an obsolete practice, and has given way to myomectomy or myotomy. In older patients persistent hæmorrhage, pressure pains, or rapid growth may call for radical treatment unless palliative measures prove rapidly beneficial. Slowly-growing tumors near the menopause without symptoms require only palliative treatment, and often none at all.

Polypoid or sessile intra-uterine growths smaller than a child's head at term can be removed through the dilated cervix, by morcellation. The uterus usually contracts readily after the removal, but, if not, a tight packing with gauze, which should be removed during the second twenty-four hours, and ergot internally, will prevent hæmorrhage.

Small subserous or intramural growths palpable on the anterior or posterior uterine walls can be enucleated and the bed sutured through an incision in the anterior or posterior vaginal fornix (anterior or posterior colpotomy). Such tumors, when larger than an egg, require abdominal section for their enucleation. Polypoid and submucous tumors larger than a foetal head at term can be enucleated by abdominal section and incision through the uterine wall. The uterus can then be sutured with catgut, and, if the bed cannot be obliterated by sutures, it can be packed with gauze that extends out through the vagina, and the peritoneal side be closed. When many intramural myomas are present the uterus may be amputated at the internal os (supravaginal hysterectomy) or be removed with the cervix (total extirpation, panhysterectomy). Multiple small fibroids with symptoms may be treated by vaginal hysterectomy.

Literature of '97-'98-'99.

The health of a woman during her sexual period of life suffers less from the loss of her uterus than from the complete removal of the ovaries. Close observation and study of clinical reports show that continued menstruation after oöphorectomy occurs under two distinct conditions: (1) when oöphorectomy has been performed for inflammatory lesions of the tubes and ovaries; (2) when the operation has been carried out to anticipate the menopause in patients with uterine myomata. The operative disadvantages of abdominal enucleation of myomata compared with hysterectomy are many. A careful consideration of all the facts makes it clear that the uterus can only be considered as a receptacle or reservoir wherein oöspers may develop. It is secondary, and certainly subservient, to the ovaries. It is not a vital organ, and its removal entails two physiological sequelæ in women during the sexual period of life, namely: amenorrhœa and sterility. J. Bland Sutton (Brit. Med. Jour., Apr. 8, '99).

Enucleation.—This is accomplished by making an incision across the tumor, catching hold of it with a vulsellum or a hook passed between the separated edges of the incision, enucleating with the fingers or blunt-edged instrument, and sewing up the bed with formaldehyde or formalin catgut.

Abdominal supravaginal hysterectomy is performed about as follows: Trendelenburg's position. Incision in median line extending from above pubes to below umbilicus. Separation of adhesions. Incision of capsule of any tumor that may be held down in pelvis, and enucleation of the tumor from its broad-ligament bed. Separation of the bladder from the uterus. Ligature of the ovarian and uterine arteries, or of the broad ligaments down to the internal os, clamping next to the uterus. Section of broad ligaments between ligatures. Am-

putation of cervix at the internal os. Disinfection of cervix. Excision of a transverse, wedge-shaped piece from cervix, leaving an anterior and posterior flap. Paring out the cervical mucous membrane. Suture of the two cervical flaps with superficial catgut sutures. Suture of anterior peritoneal flap over the stumps of broad ligaments and uterus.

An operation practiced at the Johns Hopkins Hospital, and demonstrated in upward of two hundred cases within the past two years, consists in the following steps:—

a sponge, so as to expose the supravaginal cervix.

5. Pulling the body of the uterus to the opposite side to expose the uterine artery low down on the side opened up. The vaginal portion of the cervix is located with thumb and forefinger, and the uterine artery, seen or felt, is tied just where it leaves the uterus. It is not always necessary to tie the veins.

6. The cervix is now cut completely across just above the vaginal vault, severing the body of the uterus from the cervical stump, which is left below to close the vault.

7. As the last fibres of the cervix are

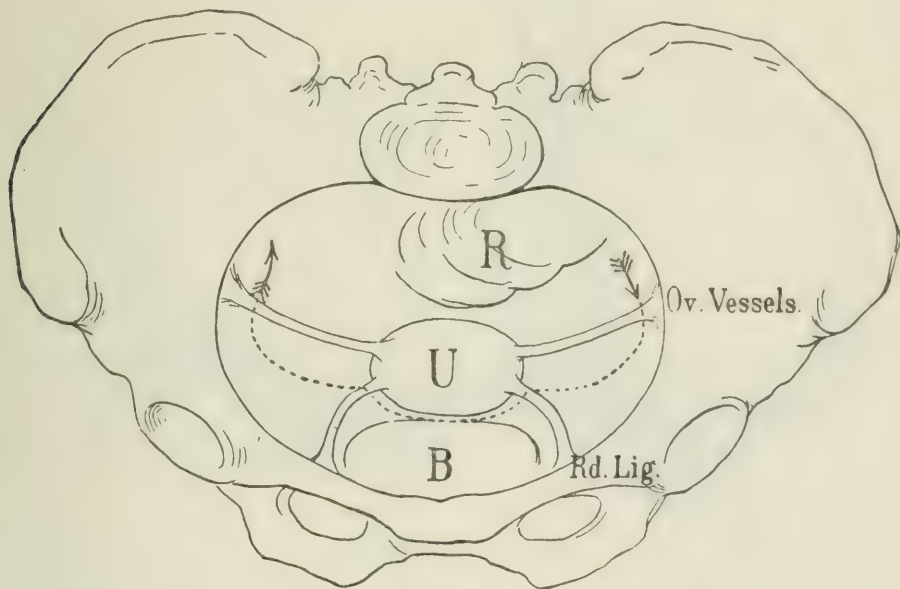


Fig. 1. (H. A. Kelly.)

1. Opening the abdomen.

2. Ligation of the ovarian vessels near the pelvic brim, either on the right or on the left side, clamping them toward the uterus, and cutting between.

3. Ligating the round ligament of the same side near the uterus, cutting it free, and connecting the two incisions, in order to open up the top of the broad ligament.

4. Incision through the vesico-uterine peritoneum from the severed round ligament across to its fellow, freeing the bladder, which is now pushed down with

severed or pulled apart, while the body of the uterus is being drawn up and rolled out in the opposite direction, the other uterine artery comes into view, and is caught with artery-forceps about an inch above the cervical stump.

8. Rolling the uterine body still farther out, the right round ligament is clamped, and cut off, and lastly the ovarian vessels are clamped at the pelvic brim, and the removal of the whole mass, consisting of uterus, tubes, and ovaries, is completed.

9. Ligatures are now applied in place

of the forceps holding the uterine artery, round ligament, and ovarian vessels; if the surgeon prefers, these may be tied, as they are exposed, without using forceps.

10. After the enucleation the operation is now finished in the usual way: (a) by closing the cervical tissue over the cervical canal, and then (b) by drawing the peritoneum of the anterior part

toneum or in the broad ligament of one side, this side should be opened up last, from below upward, whereupon the tumors can be rolled up and out with surprising facility.

The abdominal incision is always closed without drainage, by using a continuous catgut suture for the peritoneum, interrupted silver-wire sutures for the fascia, a buried continuous cat-

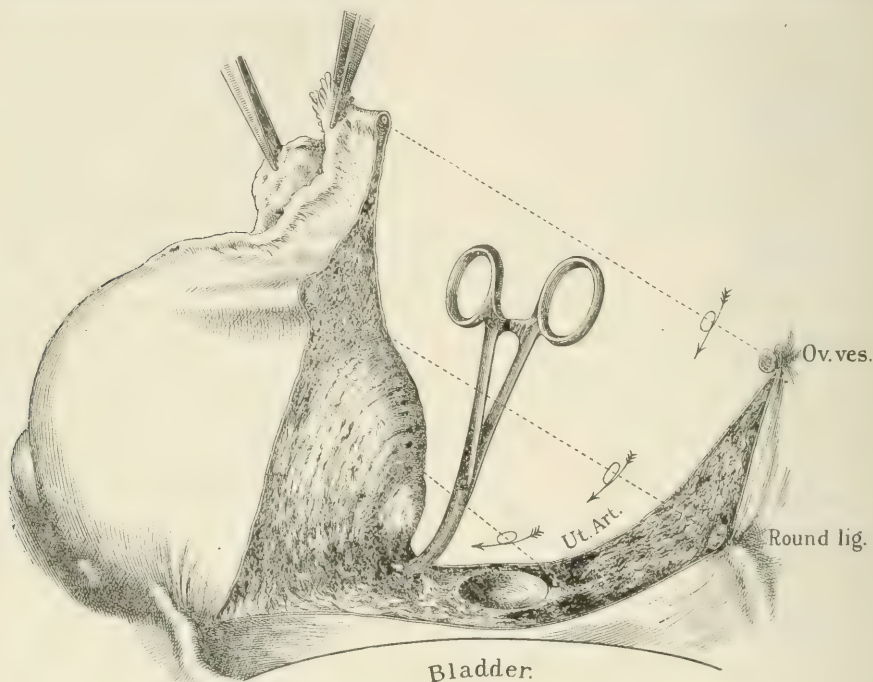


Fig. 2. (H. A. Kelly.)



Fig. 3. (H. A. Kelly.)

of the pelvis [vesical peritoneum and anterior layers of broad ligaments] over the entire wound area, and attaching it to the posterior peritoneum by a continuous catgut suture.

The continuous transverse incision should always be started on the side where the ovarian vessels and the ovary and tube are most accessible. If the case is one of a fibroid uterus, and the tumors are developed under the pelvic peri-

gut suture for the subcutaneous fat, and the subcuticular catgut suture for the skin. H. A. Kelly (Texas Med. News, May, '96).

Abdominal total hysterectomy is performed in the same way as supravaginal hysterectomy until the uterus is amputated at the cervix. Then the entire anterior cervical wall may be divided in

the median line, or the anterior vaginal wall may be grasped just in front of the cervix by forceps and the vaginal canal opened between the forceps and the cervix. An incision is then carried laterally around the cervix guided by the finger passed through the opening made. The vaginal wall is caught by a forceps wherever vessels spurt. When the cervix is cut out catgut sutures and ligatures are put on the vaginal edges, and if possible all raw tissues drawn together. If this is impossible, the unapproximated surfaces should be packed with gauze that extends into the vagina, and the peritoneum be united over it.

Vaginal hysterectomy for fibroids is usually performed for tumors from the size of an egg to a foetal head at term. A curved incision is made in the vaginal wall around the anterior edge of the cervix, and extending from the sides of the cervix straight out laterally for half an inch on either side. The bladder is pushed away from the uterus, and the peritoneal cavity opened, if possible, by tearing. A corresponding posterior vaginal incision is made, and the peritoneal cavity opened just behind the cervix. The bases of both broad ligaments are ligatured with strong catgut, and the uterus cut loose from the broad ligaments on either side as high as the ligatures are placed. The cervical canal is then incised laterally and the anterior wall of the cervix amputated. The anterior uterine wall is then grasped with tenaculum forceps, and a triangle is cut from its centre. Another is cut from either side extending higher up, and as tumors are encountered they are cut up and enucleated. Pretty soon the anterior uterine wall and tumors are all removed, and the posterior wall folds upon itself, allowing the fundus and uterine appendages to be pulled down into the

vagina. The remainder of the broad ligaments are now ligated, and all uterine tissue cut away. The peritoneum is brought down with forceps and stitched to the vaginal walls before and behind, and then the anterior and posterior vaginal walls are brought together with sutures that catch and hold the stumps.

Palliative treatment is mainly used for the relief of hæmorrhage or pain and to check the growth of the tumors. Ergot is the most valuable palliative remedy. Occasionally it expels polypoid and sessile tumors through the cervix. By diminishing the vascularity of the uterine walls hæmorrhage may be diminished and sometimes the growth of the tumors arrested. Half a drachm may be given three times daily for half or two-thirds of the time, and be continued, if necessary, for a year or more, or off and on until the change of life. Fluid extract of *hydrastis Canadensis* ($1\frac{1}{2}$ drachm three times daily) has a slight influence of a similar character.

Literature of '97-'98-'99.

Thyroid therapy is especially indicated in hæmorrhagic affections of the uterus and all forms of pelvic congestion, notably in uterine fibromata, the best results being in cases of recent development. It is well to administer the thyroid in tablets, pastilles, or capsules, in doses of $2\frac{1}{2}$ to 5 grains three or four times a day, the drug being discontinued for a period of a week or ten days at regular intervals during the course of the treatment. W. A. N. Dorland (*Ther. Gaz.*, July 15, '99).

Electricity applied to the interior of the uterus may be made to cauterize the endometrium and thus temporarily relieve the hæmorrhage.

Literature of '97-'98-'99.

The electrical treatment as carried out by Apostoli's method is efficacious in about 90 per cent. of hæmorrhagic fibroids. It acts favorably on the gen-

eral system. Pains are, in 50 per cent. of cases, relieved. In 10 per cent. the tumor is caused to disappear. Bergonié (Jour. de Méd. de Bordeaux, June 20, '97).

Curettage also acts beneficially upon the endometritis, and thus upon the hæmorrhage.

Ligature of the vessels supplying the uterus acts temporarily in diminishing the blood-supply to the uterus and in checking excessive hæmorrhage. The anastomotic circulation, however, restores, to a great extent, the original condition. The bases of the broad ligaments may be ligated through an incision in the lateral vaginal fornices (Martin, Dorsett, Gottschalk), or the upper portions may be ligated through an abdominal incision (Byron Robinson).

Literature of '97-'98-'99.

In fibroid treatment by cutting off the chief blood-supply of the uterus is rational and effective. Removal of the ovaries is often ineffective, as it is the uterine, and not the ovarian, arteries that ought to be secured. Hartmann and Fredet (Ann. de Gyn. et d'Obstet., Apr., '98).

The following results are noted in one hundred cases of vaginal hysterectomy for uterine fibroids: The mortality was 3 per cent., ligatures being used exclusively. Sixty-five patients who were examined from one to ten years after operation were entirely cured and able to perform their usual duties, being physically and mentally sound. It is of the greatest importance to make a careful examination of the entire circulatory system in every case of fibromyoma before operating. By the systematic use of subcutaneous injections of saline solution patients who have been greatly reduced from loss of blood can, in a short time, be enabled to stand even severe operations. Bushbeck (Archiv f. Gyn., B. 56, H. 1, '99).

Carcinoma of the Uterus.

Cervix Uteri.—Carcinoma affects the cervix uteri more often than any other

part of the body. It may occur at any age after puberty, but most frequently develops between the thirty-fifth and sixtieth years.

Three varieties are met with, viz.: the pavement-cell carcinoma and the ulcerating and infiltrating (nodular) forms of the cylindrical-cell carcinoma. The pavement-cell variety starts, as a rule, on the vaginal portion, and the cylindrical-cell within the cervical cavity; but when, from laceration, erosion, or other cause, the endocervical epithelium becomes squamous, or that of the vaginal portion becomes cylindrical in character, the place of origin may correspondingly change.

SQUAMOUS-CELL CARCINOMA commences as a papillary growth covered by thickened layers of epithelium. The changes are largely confined to the surface, gradually projecting, rather than extending deep into the tissues, until they reach the vaginal wall, by which time they invade the deeper structures. It does not extend to the cylindrical epithelium of the cervix until late. The overproduction of epithelial cells is surrounded by an overgrowth of connective tissue, producing fingers, or cylindrical-shaped masses, of cells that seem to project into the deeper tissues, but, in reality, extend only a short distance below their original level. The surface soon becomes fissured and necrotic, and is covered by a grumous, sticky, offensive discharge containing cell *débris*.

CYLINDRICAL-CELL carcinoma starts as a small nodule in the mucous membrane that may spread superficially, producing extensive ulceration. It extends quite early into the uterus, but does not cross to the pavement-epithelium of the vaginal portion until late.

In other cases the cervical walls are infiltrated before the ulceration becomes

extensive, and the cervix is enlarged and hardened, and exhibits the ordinary histological characteristics of carcinoma. Later the process of necrosis excavates the cervix until nothing but a shell is left.

In all forms ulceration follows sooner or later; the extension and excavation may in time reach the bladder, rectum, or ureters, and finally open these organs, and may convert the pelvic interior into a large ulcerating cavity. Obstruction of the ureters is sometimes caused by the infiltration.

Of the 9194 patients treated in Jordan's clinic, 363 (3.94 per cent.) were affected with cancer of the neck of the uterus. The majority of the patients (43 per cent.) were between 40 and 50 years old; in 31.3 per cent. the cancer developed after the menopause. In 6.3 per cent. there had been no births or abortions; the remainder had 1654 deliveries. Switalski (*Przegląd Lekarski*, Nos. 48, 49, '96).

Symptoms and Diagnosis.—Occasional slight hæmorrhages, becoming more frequent and later more abundant and offensive, constitute one of the first symptoms. A gray watery discharge, resembling dish-water and becoming more and more foul-smelling from the admixture of necrotic tissue, is observed between-times. Pain is usually a late symptom, and is a result of extension to the surrounding tissues. A severe pain extending into the iliac region or hip is more often the earliest pain. Later pains due to the surrounding cystitis, rectitis, or peritonitis may become prominent.

Anæmia, general debility, faulty digestion, septicæmia, and uræmia develop as the result of the local inflammation and sepsis.

Squamous-cell carcinomas give to the examining finger the notion of an induration or tumor of the cervix; in early

cases a mere projection of one lip, later a large mushroom-shaped growth. The surface, at first smooth and hard, soon becomes fissured and friable, and bleeds freely whenever firm pressure is made upon it. The os is seldom in the centre, as is the case when a similar mushroom shape is produced by laceration and eversion, for the changes commence on one part of the circumference, and affect that part first and to the greatest degree.

The surface, before ulceration, has a purplish color, with grayish patches corresponding to the accumulations of epithelial cells. The ulcerated surface is irregularly fissured, and has a vascular border. It presents a mottled appearance, produced by yellowish-gray necrotic areas surrounded by vascular spots in which small blood-vessels may be seen. A cheesy substance can be pressed out. All manipulations produce a persistent, bloody oozing. If the odor is not perceptible upon introducing the speculum, it will be detected when the discharges are seen, or by smelling of the examining finger.

Cylindrical-cell carcinoma without infiltration does not alter the shape or appearance of the cervix until far advanced, unless there is eversion. An introduction of the sound or dilator will usually bring out a thin, foul-smelling discharge or some granular matter and blood. If there is eversion an irregular-fissured, excavated, yellowish-red ulcer, with abrupt vascular edges, will be seen. The surface is hard, but bleeds easily.

When the cervix is infiltrated the cervix feels hard and inelastic and globularly enlarged, the largest portion being above the vaginal junction. The vaginal portion may be normal in color, but a tenaculum hooked into it will tear out easily and cause free bleeding, while in a hyperplastic cervix, or one enlarged by

a myoma, the tenaculum will hold firmly. Just before ulceration the cervix may present a yellowish-pink, granulated, glistening surface that in connection with the above is quite characteristic. The tenaculum readily tears out of a cervix that has undergone cystic degeneration, but the laceration-tissue does not bleed profusely, like carcinoma.

If the surrounding parts are infiltrated, glands will be felt beside or behind the cervix, or indurated tissue extending from the cervix under the broad or sacro-uterine ligaments, often reaching to the walls of the pelvis and immobilizing the uterus. When the ulceration reaches the vaginal junction, the parametrium is always infected.

Prognosis.—The only hope of a cure is to remove the cervix or uterus very soon after the commencement of the disease. When the vaginal walls or parametric glands become affected, a cure can no longer be expected.

Literature of '97-'98-'99.

The prognosis as regards a radical cure is better in cases of carcinoma of the cervix than of the portio vaginalis, since in the former the disease can often be entirely removed, while in the latter the vagina is early involved. Olshausen (Amer. Jour. Med. Sci., Jan., '98).

Treatment.—The best treatment is an early high amputation or hysterectomy. At present hysterectomy enjoys the greatest popularity, although, if cancer of the vaginal portion could more often be discovered earlier, amputation would probably find a place in the treatment. When amputation is resorted to, it should include quite a wide collar of vaginal mucous membrane, and should be made an inch higher than the diseased area. Were it not for the greater danger involved, abdominal hysterectomy would be preferable to vaginal, because the pelvic

glands could be enucleated in this way; but there is no hope of a permanent cure resulting when the glands have become affected.

Vaginal hysterectomy is performed somewhat differently for carcinoma than for myoma or inflammation, the difference being that we must remove as much of the surrounding tissue as possible for the former. The diseased tissue is curetted away and the cervix and uterine cavity mildly cauterized. An incision is made around the cervix in the vaginal wall fully half an inch from the diseased area. After separating the bladder, pushing it high up, and opening into the peritoneal cavity both before and behind, heavy silk ligatures are placed upon the bases of the broad ligaments about half an inch from the cervix, and tied as tightly as possible, in order that the tissue may afterward slough off. The bases of the ligaments are then cut through, and the upper portions tied. The uterus is then cut loose, the peritoneum joined with catgut to the anterior and posterior vaginal walls, the stumps united in the median line, and the corners or sides of the vaginal wound closed at the sides. The ligatures are left long, and hang out through the ununited centre of the vaginal wound. Sterilized iodoform gauze is packed into the wound and against the stumps and in the vagina, and left for four or five days, when it is removed and an unirritating antiseptic douche used. The patient is kept in bed two weeks, given only water the first twenty-four hours, liquid diet during the second and third days, and very simple, mostly liquid, diet for the remainder of the first week. The ligatures will come off in two weeks if they have been tied tightly, and will bring a slough with them.

Vaginal hysterectomy with forceps dif-

fers from that with ligatures in the fact that long-handled hæmostatic forceps are applied to the broad ligaments instead of ligatures, and are left for thirty-six or forty-eight hours, when they are removed. A pair is placed upon the base of each broad ligament, including the sacro-uterine ligament, and after the cervix is cut loose another pair is put on the remainder of each ligament. The connective-tissue vessels are secured by lighter forceps. A gauze packing is then placed between the forceps and left for two days after the forceps are taken off. The patient suffers great discomfort until they are removed.

Statistics of total hysterectomy for cancer of the cervix give the following results:—

Operators.	Number of Operations.	Recovered.	Died	Percentage of Mortality.	Percentage of Complete Cures after 2 Years.	Percentage of Recurrences before 2 Years.
Fritsch	72	64	8	10.1	35.0	57.7
Leopold	73	69	4	5.4	52.0	30.4
Schauta	65	60	5	7.6	47.3	52.7
Olshausen.....	40	...	...	...	45.5	54.5
Ott	17	17	...	...	11.7	58.8
Fenomenoff .	18	18	...	...	50.0	16.6

Excluding the percentages of recurrence in Fenomenoff's cases, and the cases of absence of recurrence in Ott's, the time of observation being, it would appear, too short in both instances, the totals will be:—

Complete cure....47.0 per cent.

Mortality 4.5 per cent.

Recurrence50.8 per cent.

Comparing amputation of the cervix with total hysterectomy, it is found that in the latter the percentage of recoveries is higher, but so is the percentage of recurrences. Partial resection of the cervix by the curette or the cautery is a better palliative than any more radical step when the parametrium is infected. Smirnoff (*La Gynéc.*, Feb., '96).

Palliative Treatment.—When a radical operation is inadmissible, the diseased

area may be thoroughly curetted and cauterized with the strong solution of chloride of iron or a 50-per-cent. solution of zinc chloride, applied on a pledget of cotton placed against the wound and held in place for twelve hours by a gauze tampon.

Hæmorrhage and odor from the ulcerated parts can, for a time, be controlled by strong astringent and antiseptic injections. A 1 to 500 solution of chloride of zinc acts both ways, as does permanganate of potassium. The strength is limited by the toleration of the vagina and vulva.

Anodynes should be given freely for pain, commencing with the milder ones and ending with opiates. They do less harm than does the suffering. The general treatment should be a supporting one.

Corpus Uteri.—Three varieties of carcinoma of the endometrium have been described: adenocarcinoma, malignant adenoma, and squamous-cell carcinoma.

The adenocarcinoma is similar to adenocarcinoma of the cervix, and affects the mucous membrane quite extensively before deeply infiltrating the uterine walls.

Malignant adenoma commences as an enlargement and folding of the gland-tubules, while still lined with a single layer of epithelium. The folds of contiguous glands unite and form anastomosing tubules filled with epithelial cells, which begin to proliferate atypically, and gradually distend and break through the tubules, to form the ordinary nest-structure of cancer.

Squamous-cell carcinoma may occur as a primary growth in those cases in which the epithelium of the endometrium has become squamous in character, or it occurs secondary to squamous epithelioma of the cervix.

The uterine wall is slowly invaded, and the glands of the broad ligament and along the internal iliac vessels become infected. When the changes have passed through the uterine walls, peritoneal adhesions and infiltrations of the broad-ligament connective tissue are formed.

SYMPTOMS.—Watery and bloody discharges, gradually becoming offensive and mixed with small particles of broken-down tissue, are the first symptoms. Pain becomes prominent in the advanced stages. If discharges and disintegrating masses of tissue are retained, it is colicky in character, but in time those of chronic peritonitis assume prominence. Pains shooting into the iliac regions and down the limbs also become troublesome after extensive infiltration has taken place.

DIAGNOSIS.—The offensive and irregular bloody discharges beginning at or after the menopause, the character of the pains and the progressive nature of the symptoms arouse suspicion. Microscopical examination of the tissue brought out by a curette should always be made.

PROGNOSIS.—The prognosis is better than that of carcinoma of the cervix; the surrounding tissues are not as rapidly infected. An early operation often effects a cure.

Literature of '97-'98-'99.

Of 104 cases of uterine cancer treated by total extirpation of the womb, there were 8 post-operative deaths; 38 died of recurrences; 7 were lost to view, although it was known that recurrence had taken place. Two died of metastasis, and in 14 the cause of death was unknown. Thirty-two remained free from recurrence (30.7 per cent.); 13 of these were living more than five years after operation. Of the 14 cases of carcinoma of the body of the uterus, 10 were free from recurrence; 3 of the latter were under thirty years of age, and

1 had remained well nine years, and 1 six and a half years, after operation.

Among the cases which recurred, the average period of recurrence was a little over nine months; the average duration of life about seventeen months. Thumin (Berl. klin. Woch., Nos. 18, 19, '98).

TREATMENT.—The only indication is hysterectomy. Abdominal hysterectomy would seem to have the preference, since affected glands of the broad ligament and at the pelvic brim can be seen and enucleated. If the surrounding glands are affected the disease may be expected to return even though the visible ones be removed; hence the only benefit of abdominal over vaginal hysterectomy is that the return may be somewhat slower. Therefore the former is only to be chosen when the conditions are such that the risk would be but little greater: *i.e.*, when the vaginal method presents some unusual difficulties.

Vaginal hysterectomy is performed the same as for carcinoma of the cervix, except that the incisions can be made close to the cervix, and that the Fallopian tubes and as much of the upper portions of the broad ligaments as possible should be taken.

Curettage is only palliative, and should be done with a sharp curette without pressure against the friable uterine walls. Carbolic acid, the solution of perchloride of iron, or a 50-per-cent. solution of zinc chloride should then be applied freely to the uterine cavity.

Literature of '97-'98-'99.

In Winckel's wards the treatment of advanced uterine cancer consists of free burning of the diseased tissue by the thermocautery. In 60.8 per cent. the patient remained free from the three cardinal symptoms—hemorrhage, discharge, and pain—for from a fortnight

to six months, or seven weeks on an average. Slight rise of temperature was observed in 32 out of 100 patients. Only 1 death is noted. Berton (Centralb. f. Gyn., No. 43, '97).

Deciduoma Malignum.—Malignant degeneration of the placental part of the chorion sometimes takes place, giving rise to a growth that has, as yet, not been sufficiently studied to enable us to give it a definite place in pathology. At present most authors consider it as a carcinoma of the chorion that seems to involve mainly the ectodermal and syncytial layers. It is composed of polymorphous and giant epithelial cells imbedded in connective tissue.

It more often originates after labor or interrupted pregnancy, either uterine or extra-uterine, or after the expulsion of an hydatidiform mole.

It is characterized by extreme malignancy, rapidly invading the uterine walls and broad ligaments and producing metastatic deposits in distant organs.

SYMPTOMS.—The symptoms are abundant, repeated hæmorrhages, offensive discharges, and rapid enlargement of the uterus. When occurring near a labor or abortion, the uterus seems to remain enlarged, and a curettage to remove the supposed remains of the placenta produces only temporary relief.

TREATMENT.—The treatment consists in an early hysterectomy, the rapid development leaving no time for hesitation or delay. If the uterus is not much enlarged, it may be removed by vaginal section; but, if much enlarged and softened, by the abdominal method.

Sarcoma of the Uterus.—Sarcoma of the uterus occurs as a papillary or polypoid growth on the cervix, as a diffuse growth on the endometrium, and as an interstitial tumor.

The disease is very rare, and may occur at any age.

SARCOMA OF THE CERVIX contains round and spindle cells. It is soft and usually papillary in structure, and projects in polypoid masses from the vaginal portion until it fills the vagina and exerts pressure on the rectum and bladder. It spreads into the cervix and uterine cavity and into the connective tissue and peritoneum about the cervix.

Symptoms and Diagnosis.—The symptoms are abundant hæmorrhage and irritating and offensive discharges. Retention of urine, difficult defecation, and expulsion of dark-colored, offensive masses from the cervix soon become noticeable. Anæmia and cachexia develop sooner or later, pelvic neuralgic and peritoneal pains supervene, and finally death ensues from exhaustion or peritonitis.

The diagnosis is made by the microscope, although youth of the patient, the predominance of early hæmorrhage, and the abundance of dark, soft, polypoid masses hanging from the cervix indicate the nature of the disease. The hydatid mole does not break down or bleed as easily, and can be braced into the uterine cavity.

SARCOMA OF THE ENDOMETRIUM belongs to the round-cell variety. It is usually a diffuse papillary growth, and fills the uterine cavity with a soft, brain-like substance that may project into the vagina. The uterine walls become infiltrated, and finally the surrounding organs also.

The symptoms are watery discharges, and later profuse hæmorrhage, becoming offensive and mixed with pus. Anæmia, septicæmia, and pelvic pains become prominent.

The diagnosis may sometimes be made from the abundance of the hæmorrhage, character of the tissue that can be scooped out of the uterus, the uterine enlargement, and the general symptoms

of malignant disease, although the tissue should be examined under the microscope.

INTERSTITIAL SARCOMA resembles intramural myoma in appearance, and consists of round and spindle cells, largely of the latter. It may occur as circumscribed nodules or as a diffuse growth of spindle cells. The submucous tumors sometimes become polypoid. Some are supposed to have been myoma that have undergone sarcomatous degeneration. Rarely they originate in the cervix.

Symptoms.—The symptoms are similar to those of myoma uteri, but they grow more rapidly and are attended later by offensive discharges. Early menorrhagia is apt to be less prominent than those from myomas. Pain and the general symptoms of malignancy are late in appearing.

Diagnosis.—The diagnosis is based upon its variation from myoma, on the

one hand, and carcinoma or sarcoma of the endometrium, on the other. It grows faster than myoma, but does not become very large before it causes symptoms of malignancy. However, it enlarges the uterus more than carcinoma or sarcoma of the endometrium before causing pain, cachexia, offensive discharges, etc.

Literature of '97-'98-'99.

Personal analysis of 2649 consecutive cases of primary uterine neoplasms discovered only 2 sarcomas, and in Gault's analysis of 4115 uterine neoplasms were only 8. W. Roger Williams (Brit. Gyn. Jour., May, '97).

The *treatment* of all forms of sarcoma is hysterectomy according to methods described for carcinoma and myoma. Owing to the tendency to spread by way of the circulation to distant structures, the operation should be early and radical.

HENRY T. BYFORD,

Chicago.

V

VAGINA AND VULVA, DISEASES OF.

Diseases of the Vagina.

It is not strange that an organ which is subject to excessive use and abuse as the vagina should be so susceptible to disease and injury. This organ is an essential part of the parturient canal; sexual passion, in love or licentiousness, is concentrated upon it; and its relation to the other pelvic organs is so intimate that it is quite certain to bear a larger or smaller share of the ills which they experience.

Vaginitis.

The inflammatory affections of the vagina may be divided into the (1) traumatic and (2) infectious.

Traumatic Vaginitis.

Symptoms.—Pain, swelling, local elevation of temperature and congestion are

distinguishing symptoms. Even moderate pressure, the introduction of a speculum, or violence of any kind may cause great pain and more or less bleeding. The acute symptoms are usually of short duration, and may disappear in a few days with judicious treatment. An inflammation in such vascular tissue as the vagina is easily excited, and its abundant lymphatic supply and large absorbent surface demand that the conditions be kept as aseptic as possible. Especially in those cases in which there is suppuration or sloughing should one remember the possibility of converting the case from one of simple inflammation to one with infectious and constitutional elements.

Etiology.—This, like the kindred vulvar disease, may be accidental or intentional. The former, as in the vulvar

disease, may arise from violent and brutal coitus, from the thrust of sticks or other substances of wood or metal, from violent and unskillful attempts to produce abortion, from prolonged or complicated parturition, and from the caustic effect of heat and chemicals.

The infectious variety may proceed from wounds inflicted by the surgeon (*e.g.*, those which are made to facilitate delivery), from strangulation of tissues which have been too tightly ligated in the repair of vaginal injuries, or from the actual or potential cautery.

Treatment.—Simple measures of treatment are always the most effective. Gentleness of manipulation will be helpful; harshness will prolong the unfavorable conditions. Douches with hot saline solution or weak solution of lead and opium (U. S. P.) will serve the double purpose of cleanliness and relieving pain. The douches may be repeated twice daily and in the interval a pad of absorbent cotton may be secured against the vulva and kept moist with the lead-and-opium wash. The bowels must be kept open with salines or any approved mild cathartic. Rest in bed will hasten the termination of the inflammatory process.

When extensive ulceration is known to exist in the vagina, the case should be examined from time to time until the ulcers have healed, so that the exact condition can be determined and the proper steps taken, if necessary, to prevent stenosis. When caustics are to be used in the vagina, the healthy portion of the mucous membrane should be protected by vaselin, only cauterizing that portion which is absolutely in need of it. When a tumor has been removed from the vagina, or other operation done, where a section has been removed, the case should be examined after healing is complete, to ascertain the condition and extent of the cicatricial tissue. Lacerations of the vagina occurring dur-

ing labor should be closed immediately, if possible. F. D. Thompson (Hot Springs Med. Jour., Jan. 15, '96).

Infectious Vaginitis.

If the inflammatory condition has an infectious origin, the causes may be varied and distinct. There are few germs or microbes which normally find their habitat in the vagina. An acid mucus, the normal secretion of its mucous membrane, acts as an effectual antiseptic barrier, in many cases, to the attacks of microbes; otherwise the morbidity of this organ would be even much greater than it is. The following varieties of infectious vaginitis are well recognized:—

- | | | |
|------------------|---|--------------|
| 1. Venereal | { | Gonorrhœal. |
| | | Chancroidal. |
| | | Syphilitic. |
| 2. Tuberculous. | | |
| 3. Diphtheritic. | | |
| 4. Puerperal. | | |
| 5. Eczematous. | | |

This classification, it will be observed, is not very dissimilar to that hereinafter suggested for infectious vulvitis.

Venereal Vaginitis.

Symptoms and Etiology.—Gonorrhœal infection of the vagina has been carefully investigated since Nöggerath published his epoch-making paper in 1869, and the subsequent discovery, by Neisser, of the gonococcus. The infection is seldom limited to the vagina, the disturbance being shared by the vulva and uterus, and not infrequently by the uterine appendages and the peritoneum. It may be acute or chronic, and repeated acute attacks are not unusual. The symptoms may begin within twenty-four hours of the reception of the infectious material, or they may be deferred for five or six days. The disease is usually the result of coitus, but it is sometimes due to soiled towels, instruments, or

fingers. No age is exempt from it, but it is most common with women from twenty to thirty years of age, when the tissues have their greatest activity and vitality. It rapidly spreads from the point of infection to the contiguous epithelium, until the entire vagina may be involved. There may be infiltration of the subepithelial structures, but the epithelium and the superficial vessels are chiefly involved. Congestion, pain, and swelling are noteworthy, but there may be little constitutional disturbance. The mucous membrane is dry for two or three days and bleeds readily; then there is a purulent discharge for several days and a gradual subsidence of the severe symptoms.

Treatment.—Rest in bed and alkaline diuretics, as:—

R Sodæ benzoat., 5 drachms.
Fl. ext. buchu, 4 drachms.
Tinct. hyoscyami, 5 drachms.
Aq. gaultheriæ, ad 4 ounces.

M. Sig.: Teaspoonful in water after meals.

Saline cathartics (Congress water, Hunyadi, or Rubinat, a glass before breakfast) are also indicated.

Local applications are very painful, and should be deferred until the discharge begins to flow. A well-lubricated speculum should then be carefully introduced into the vagina and opened as freely as the painful condition will permit. The entire mucous membrane may then be gently swabbed with a 10-per-cent. solution of nitrate of silver or a 2-per-cent. solution of protargol. This should be repeated daily as long as the discharge persists. Excessive or meddling treatment will intensify the symptoms, and it is better to wait for the subsidence of the acute stage than be overzealous and inflict great pain. It is

hardly necessary to say that the instruments and the hands of the physician must be rigorously cleansed after treating such a case. Chancroidal and syphilitic vaginitis usually mean the characteristic sores or ulcers upon the vaginal mucous membrane. It may be difficult to differentiate them, as there may be only a mucous patch or superficial ulcer, which will often be found near the entrance of the vagina. Whether the disease is local or constitutional will usually be determined by other symptoms. Nothing better can be suggested than cleanliness and the use of nitrate-of-silver solution for the healing of these sores, but the walls of the vagina can be kept apart with a tampon of cotton-wool moistened with a 2-per-cent. solution of ichthyol in glycerin. Douches with hot creolin solution (1 or 2 per cent.) may also be used morning and evening.

Tuberculous Vaginitis.

Symptoms.—The character of the disease is that which is peculiar to miliary tubercle upon mucous membranes in general, the tubercle being a localized lenticular mass varying in size from a pin's head to a pea, slightly raised above the surface, grayish in color, quickly breaking down and forming a ragged ulcer with infiltrated walls, neighboring ulcers frequently coalescing and showing slight tendency to heal. There may be only a small number of tubercles or the vagina may be studded with them. They are painful to the touch, secrete a sanious discharge, which excoriates tissues with which it is brought in contact, and should be differentiated from the ulcerative lesions of venereal vaginitis. Acute local symptoms are usually wanting. The many avenues for transmission of the tubercle bacillus from the vagina to other parts must not be forgotten, nor

the ease with which general infection may follow the local one in the vagina.

Etiology.—This is one of the rarest forms of tubercular disease, but its existence is affirmed by competent authority. It is rarely an isolated process, being usually an element in disseminated tubercular infection. It may be communicated during coitus from a tuberculous ulceration of the penis.

Treatment.—The treatment must be both constitutional and local, the former embracing such means as are usually administered in tuberculosis, iron, oxygen, creasote, codliver-oil, alcohol, and an abundance of nourishing food; the latter consisting in cleanliness, creolin douches (1 or 2 per cent.) twice daily, and local applications of a 10-per-cent. solution of nitrate of silver or of the mineral acids in moderate strength. The object of the local applications, it must be remembered, is to stimulate the tissues to healthy activity, and to prevent spreading of the ulcerative process, *not* to cauterize the tissues.

Diphtheritic Vaginitis.

Symptoms and Etiology.—This condition implies the deposit of an exudate and the formation of a fibrinous false membrane, as in the similar process upon a mucous membrane in any other part of the body. This membrane is a grayish, sloughy formation similar to that which is so frequently seen in the pharynx. Its development is attended with the usual symptoms of acute inflammation, and forcible treatment of it will be attended with pain and hæmorrhage. It may occur either in children or in adults. It has been observed in connection with pharyngeal diphtheria, with the eruptive fevers, and with puerperal septicæmia. It is a symptom of grave importance whatever its associations may be, for it indicates a septic condi-

tion which is usually profound and general.

Literature of '97-'98-'99.

Attention is drawn to the frequency of so-called diphtheritic endometritis or vaginitis, and to the extreme rarity of cases in which really the bacillus diphtheriæ is the cause of the gray slough. It is not right to speak of puerperal diphtheria unless the presence of the diphtheria bacilli has been demonstrated in the membranes. The majority of so-called diphtheritic membranes of the vulva, vagina, etc., do not contain the bacillus diphtheriæ, but are due to streptococci. J. Whitridge Williams (*Amer. Jour. of Obstet.; Brit. Gyn. Jour.*, Feb., '99).

Treatment.—The constitutional treatment must be that of the disease of which the vaginitis forms but a part. It must be supporting and tonic, and may include iron in an assimilable form (Blaud's pills, the peptomanganate, tincture of the chloride, etc.), strychnine, quinine (the elixir of iron, quinine, and strychnine is a useful combination), milk, and nourishing broths. Alcohol (whisky, port, sherry, or champagne) is usually indicated, both for its stimulating and its antiseptic effects. The value of alcohol in these depressing, toxic conditions can hardly be overestimated. For local treatment little should be attempted beyond perfect cleanliness. When the membrane begins to disintegrate or exfoliate, it should be gently removed with dressing-forceps, and hot antiseptic douches (creolin, 2 per cent., at a temperature of about 100° F.) should be given twice daily as the conditions warrant.

Puerperal Vaginitis.

Symptoms and Etiology.—This condition, which forms a part of the diseased puerperal condition formerly known as puerperal fever, may include the condi-

tion which has previously been described, though puerperal vaginitis is not necessarily—indeed, is not usually—diphtheritic.

It may occur to puerperal women of any age or social grade, to rich or poor. In surroundings which are manifestly dirty and with doctors or midwives who are plainly careless or neglectful it is most frequently encountered, but it sometimes occurs when the precautions on the part of doctor and nurse have been most rigid and complete.

The infecting material may be received in the vagina itself or in the vulva or uterus, the infection extending to the vagina. It may be the streptococcus or the mixed streptococcus and staphylococcus, or organisms of lower virulence. The local vaginal symptoms may not be acute, for the disease is seldom limited to the vagina, or there may be the symptoms of an ordinary infectious vaginitis which have been noted in the foregoing pages.

Treatment.—The treatment is such as would be appropriate with diphtheritic vaginitis, and need not be repeated. Cleanliness and antiseptic douches are the chief measures for reliance. Apart from these, the vitality of the patient will determine whether the progress of the disease and its outcome will be favorable or unfavorable.

Eczematous Vaginitis.

Symptoms.—It runs no well-defined course, its most noteworthy symptom being an acrid watery discharge, which excoriates the skin of the external genitals, causing great distress and annoyance from persistent itching. The itching may extend to the vulva and perineum; the vaginal mucous membrane may be swollen, sensitive, and congested, and attempts to relieve it by friction often intensify the irritation. Constant

rubbing will sometimes produce great annoyance from the provoking of sexual feeling, and this is the more regrettable because of its inappropriateness in those who are of mature or advanced years.

The discharge and irritation may extend to the mucous membrane of the uterine canal, in which case the treatment must include that organ.

Etiology.—Eczematous vaginitis rarely occurs except in women who have passed the menopause. It has often been described under the nomenclature of senile vaginitis. It is almost invariably associated with eczema of the vulva, which is hereinafter considered.

The cause, so far as I can ascertain, has not yet been detected, though it is probably a vegetable germ. In my experience it is quite a common disease and has been observed the more frequently among those who are not over-particular in their personal habits.

Treatment.—Treatment should consist in careful cleansing of the vagina with 10-per-cent. solution of nitrate of silver applied upon a swab of absorbent cotton to *every portion of the mucous membrane*. An ample tampon of cotton-wool moistened with the paste of glycerin and bismuth (mentioned in connection with diseases of the vulva) should then be placed in the vagina, the relief being almost always definite and satisfactory. The applications must be made daily until the congestion and discharge have entirely ceased, and sedative and astringent douches should be used daily before the tampon is renewed. In case the constitutional symptoms in a given case are severe it would, of course, be inappropriate to carry out the local treatment with regularity. Common sense must be the guide, and, if the disturbances caused by local interference were likely to be greater than the advantages to be gained,

the former should stand aside for the time.

Leucorrhœa.

There is scarcely any morbid condition from which women suffer which is more common than leucorrhœa. By this term is meant the fluid discharge, more or less sticky, more or less purulent, milk-like in appearance, variable in quantity, and sometimes offensive in odor, which may occur at any age and in any social condition. The vaginal discharges from those forms of inflammation which have been described are excluded. The condition which causes the discharge is not an inflammatory one, in the broadest sense of the term, but an irritative one, in which there is excess of secretion from the vaginal epithelium, and probably transudation of serum and corpuscles from the vaginal blood-vessels, at least in some cases. The discharge is the more profuse as the tension in the blood-current is increased: therefore just before and just after the menstrual flow.

Symptoms.—While it must be admitted that leucorrhœa is a symptom, it is also the direct expression of a diseased condition, and it produces a variety of unpleasant results. The daily discharge may amount to several ounces, and the removal of this volume of fluid, especially in those who are already debilitated, may add materially to the existing condition of weakness. It may also produce an intense irritation of the skin which it soils, causing itching and pain, which may become almost unbearable.

Etiology.—Among its many causes may be mentioned: 1. Conditions in which the freedom of the pelvic circulation is impaired; *e.g.*, pregnancy, new growths, and inflammatory conditions within the pelvis. 2. A relaxed and catarrhal condition of the mucous mem-

branes in general; *e.g.*, anæmia, fatigue, and the catarrhal diathesis. 3. Excessive function; *e.g.*, frequent coitus.

Treatment.—The treatment consists first in cleanliness, the discharge being received upon absorbent-cotton pads as soon as voided; next in relieving, as far as possible, the conditions which have caused it: and, finally, in the use of astringent douches, such as have frequently been referred to, to remove, as far as possible, the local conditions which favor its continuance.

Atrophy of the Vagina.

This condition is the natural result of age and the decay of function; it is a diseased condition when it occurs prematurely, or as the result of other diseased conditions. It occurs after the removal of the ovaries and the premature production of the menopause; sometimes in connection with excessive obesity and wasting diseases, which cause atrophy of all the genital organs. The lumen of the vagina, under these conditions, is contracted, the mucous membrane is pale, and it fails to respond to those stimuli to which the healthy mucous membrane ordinarily reacts. In a word, its vitality as a functioning organ is practically abolished. No particular treatment is indicated, its work as an organ being accomplished.

Hypertrophy of the Vagina.

Excessive use, as in all organs of the body, will cause hypertrophy of the vagina. Its walls may merely be thickened or they may be disposed in folds and ridges. It may be due to excessive child-bearing, excessive coitus, or to an accumulation of fat and connective tissue, which is part of a general process. If it is unattended by prolapse, it may give rise to no disagreeable symptoms, and consequently calls for no particular treatment.

Prolapse of the Vagina.

This condition of the vagina may exist without hypertrophy, but is usually associated with it. Either the anterior or the posterior wall or both may be prolapsed. The conditions which cause hypertrophy are also in most cases the cause of prolapse.

Treatment.—The treatment may be palliative or radical. The former consists in the use of pessaries, electricity, or astringent substances to contract the redundant tissues. Though this may be effective for the time, the moment the treatment is discontinued the unfavorable conditions will recur. Hence radical surgical measures are to be recommended as preferable. Such measures consist in the removal of superfluous tissue and the restoration of the vagina to its normal condition. Various operations have been suggested for this purpose, but I shall describe only those which have been of greatest service in my own experience. For prolapse of the posterior wall the simplest operation and the one which will be applicable to the greatest number of cases is that which was devised by Hegar. It consists, in brief, in the removal of a triangular or nearly triangular strip of the vaginal mucous membrane, the apex of the triangle being near the os uteri and the base at the introitus vaginae. The size of this triangle must be regulated by the degree of prolapse and the width of the vaginal wall. By depressing the vaginal wall in its middle line with a sound and drawing the mucous membrane over it on either side until the necessary amount of slack has been taken up, the sides of the triangle may be determined. Having outlined the sides by incision with a scalpel uniting them as near the os uteri as the redundancy of the tissue demands, grasp the tissue at the apex and dissect

downward as rapidly as possible, removing as little of the submucous tissue as is convenient, and remembering that the rectum lies immediately under the vagina, and that it is very undesirable to enter it. The hæmorrhage is sometimes very profuse, but it can generally be checked by pressure with gauze pads. The junction of the mucous membrane of the vagina with the skin of the perineum may form the base-line of the triangle, the tissue being removed to this junction. The wound may then be irrigated with hot saline solution, and then covered with a very hot gauze pad or sterilized towel until the sutures are ready for insertion. Fine aseptic catgut (No. 1 or No. 2) may be used and a sharp-pointed half-round needle an inch and a half or two inches long. The sutures may be interrupted or continuous, the latter being introduced the more easily and quickly. It is essential that the edges of the wound be carefully approximated to each other. The denuded area having been closed, a gap in the skin of the perineum will remain as the result of bringing the ends of the base-line together. This may be closed with three deep, interrupted sutures which must make a sufficiently broad sweep in the perineum to draw forward the retracted muscular tissue. If the injury is of long standing, much of the original muscular tissue of the perineum will have atrophied; much of it may have entirely disappeared. It will therefore be a futile task to attempt to recover by dissection that which does not exist, or seldom exists,—namely: the muscles of the perineum.—as they were related and disposed prior to the accident which tore them apart, exposed them, and was followed by degenerative changes. The entire wound may then be irrigated, dried, and covered with a thin film of iodoform

collodion, the vagina then receiving a light dressing of iodoform gauze, while the wound is protected outwardly by absorbent cotton and a T-bandage. Perfect cleanliness of the wound for the succeeding week, the patient being kept quietly in bed upon her back, with legs tied together, will favor a successful result. It is not insisted that failure will follow less rigorous measures. I have found that the extra trouble and self-denial on the part of the patient usually paid. Ten days or two weeks in bed will usually suffice. Instead of catgut for the perineal sutures one may use worm-gut or silver wire with good satisfaction. They cause a little more trouble in introduction and require removal when the wound is healed; that is, in ten days.

For prolapse of the anterior wall a method of treatment by an operation which was devised by me several years ago is suggested (*Annals of Gyn. and Ped.*, vol. iii, p. 516, '90). It is assumed that the prolapse of the vaginal wall is extensive, an elliptical strip of mucous membrane is removed from the long axis of the vagina, the vaginal wall being depressed with a sound (as in Hegar's operation on the posterior vaginal wall) to determine the extent to which the redundant tissue is to be removed. Then another ellipse, sufficiently large, is removed at right angles to the first, the plane of each ellipse cutting that of the other at its middle. With suitable precautions against hæmorrhage, the edges of each quadrant (or half-ellipse) in the denuded area are then united from end to centre with aseptic catgut, the ends being carefully tied to close with neatness the central portion of the wound, which may show a tendency to gape. Iodine collodion is then applied to the wound and iodoform-gauze dressing in

the vagina. After rest in bed for ten days and perfect cleanliness, it will usually be found that the wounds have healed by first intention.

Literature of '97-'98-'99.

Complete removal of the vagina and uterus for those extreme cases of prolapse of the uterus and vagina which resist all other treatment, including colporrhaphy. The stages of the operation are as follow: 1. A circular incision is carried through the vagina at the former site of the hymen, about $\frac{1}{2}$ centimetre behind the orifice of the urethra in front. 2. A vertical incision is made in the posterior vaginal wall up to the fold of peritoneum forming Douglas's pouch. After ascertaining the position of the rectum, six sutures are passed through the skin-margin of the circular incision, on the one hand, and through the peritoneum of Douglas's pouch, on the other, whereby the peritoneum is firmly joined to the external skin. 3. Anterior colpotomy is then performed, the bladder and urethra are separated from the vagina, and the plica peritonei anterior opened and sutured to the anterior part of the incision, whereby the bladder is raised and pushed forward. 4. The lateral wall of the vagina is then raised from the underlying tissue as far as the cervix, the broad ligament is ligatured, and here also the peritoneum is sutured to the lateral part of the circular incision. After doing this on both sides, there is a funnel-shaped cavity where the uterus and vagina formerly were, which is completely covered in by peritoneum, and by the tension of the remains of the ligaments the margins of the vulva are drawn tightly inward and upward. The external opening of this peritoneal funnel at the vulva is then closed by sutures, which draw the edges of the circular incision together, and the peritoneal surfaces in contact at the sides. This operation has been personally performed in ten cases, and always with most satisfactory results. A necessary condition for success is that the vagina be excised completely, right up

to the hymen. A. Martin (Berl. klin. Woch., Oct. 3, 10, '98).

Vaginismus.

This term was used by Sims, Thomas, and others to denote an excessive degree of hyperæsthesia, together with spasm of the muscles which form its outer wall and which render any contact with the vagina annoying or even positively painful. Hyperæsthesia of the vulva or of the vagina is a better term, as this is the significant condition. The trouble may often be referred to the sensitive remains of the hymen, which may not bear the slightest pressure or even suggestion of pressure without exciting painful emotion and spasm.

Treatment.—The induction of general anæsthesia, dilatation of the introitus vaginae and excision of the ring of tissue which is the remnant of the hymen will usually cure the trouble. The hæmorrhage attending such an operation may be profuse, and it is always desirable to tie all bleeding vessels and preclude subsequent hæmorrhage by the pressure of a tampon filling the entrance of the vagina.

Fistulæ and Tumors.

Fistulæ communicating with the vagina may also communicate with the bladder, uterus, ureter, intestine, rectum, or pelvic connective tissue. They are most frequently the result of a prolonged and difficult labor, but they may also result from sepsis following surgical operations and from inflammatory disease of the pelvis in general. Uretero-vaginal and uretero-utero-vaginal fistulæ are rare; so also is uretero-vaginal fistula, the latter following rupture of the uterus. Entero-vaginal fistula may follow hysterectomy, removal of the appendix, or any complicated operation within the pelvis in which the intestine, including the rectum, has been injured.

This form of injury has become more frequent since the removal of diseased structures by way of the vagina became an approved method of procedure.

A vaginal fistula means the passage of urine, fæces, or pus into the vagina by way of a canal connecting with the bladder, intestine, or an abscess within the pelvis. It is a very distressing condition, and the problem involved is to obliterate this canal. Such a problem is usually difficult and is subject to frequent failures.

Treatment.—A cure will sometimes result spontaneously; but, if so desirable an issue is wanting, the cure can only be obtained by surgical measures.

Two classes of cases may be considered: those in which the fistula alone is to be regarded and obliterated and those in which this procedure alone will not suffice, the organ, or abscess, or tissue having communication with the vagina requiring separate treatment or removal.

In the first class may be mentioned the fistulæ communicating with the bladder, rectum, and ureter, and some of those which connect with the uterus, intestine, and pelvic connective tissue. In the second class are those which connect with the tubes and ovaries, intestine, appendix, and pelvic tissue. For the first class of cases the lines of treatment have been clearly defined by many writers. They require that the vaginal mucous membrane be carefully and broadly denuded, the adhesive attachment between the vagina and the other injured organ being usually maintained. The denuded tissues are then brought into such accurate apposition, that no leakage can occur. For suture material in such cases I believe that nothing has been discovered which is equal to fine pliable silver wire. Each suture is carefully twisted so as to

furnish an adequate splint to the tissues during the process of healing, but care must be taken that it be not twisted too tightly, thereby defeating the very object of uniting the denuded surfaces. The sutures are to be retained from seven to ten days, and then carefully removed. In vesico-vaginal fistula it has always seemed to me rational and useful to keep a catheter within the bladder for constant drainage as long as the wound remains unhealed.

Personal operation in vesico-vaginal fistula is as follows:—

1. A crescentic incision separating the muscular and mucous coats from the vagina is made around the posterior two-thirds of the fistula, and the bladder detached from the supravaginal cervix all the way up to the peritoneum, and widely on both sides, by a blunt dissection.

2. Next a strip is denuded around the remaining anterior third of the fistula on its vaginal surface, the denudation being carried down to the mucosa of the bladder and the urethra.

3. Two flexible urethral catheters $2\frac{1}{4}$ millimetres in diameter are passed through the urethra across the fistula, and one conducted into each ureter and pushed up above the brim of the pelvis.

4. The part of the bladder freed from its attachments behind is now easily drawn forward and accurately applied to the immovable anterior third, to which it is united by interrupted fine silk-worm-gut sutures. Each suture catches the under surface of the muscular coat of the bladder so as to turn the cut edge up toward the newly-formed bladder. The urethral orifices fixed on this edge are in this way turned into the bladder, and escape transfixion or compression by the sutures through the presence of the catheters, which make their position plain. These urethral catheters may be left *in situ* for a few days, thus draining each kidney directly through its ureter and preventing any urine from entering the bladder. H. A. Kelly (Johns Hopkins Hosp. Bull., Mar., '96).

Literature of '97-'98-'99.

Six cases of complicated vesical fistula operated upon successfully by the method described by Freund. Douglas's pouch was opened, the fundus uteri drawn down through the opening, and after freshening the edges of the fistula and the posterior uterine wall near the fundus the latter was sutured to the bladder, so as to close the fistula.

It is unnecessary to make an opening in the fundus for the escape of menstrual discharge as suggested by Freund. Romm and Kahn (Centralb. f. Gynäk., No. 9, '97).

Forty-four cases of fistula were observed in the hospital at Saratoff among 1004 gynæcological cases (4.36 per cent.). As regards the results of operative interference, 47.74 per cent. were cured by a single operation; 6.81 per cent. by two; 18.18 per cent. were relieved by diminishing the size of the fistula; episociocleisis was successful in one instance; eight patients were not relieved. The denuded surface was always quite extensive, and was made so that the edges could be approximated with the least possible tension. Silk sutures were generally used (rarely silver wire), which were removed on the sixth or eighth day. A catheter was left in the bladder for nine or ten days, after which time the patient was allowed to leave her bed. Anæsthesia was rarely used. Rouzmine (Boln. Gaz. Botkina; La Gynéc., Apr. 15, '98).

In vesico-vaginal fistula the reformation of the bladder-wall is the essential point for cure. After the separation of the flap around the fistula four double threads are passed, thin ends knotted and lying outside the vagina (two only are shown in Fig. 1). A pair of curved forceps is passed through the urethra up to the fistula, and the four pairs of threads are brought together and their knotted ends placed within the grip of the forceps. If gentle traction is made upon these, as is seen in Fig. 2, the circular flap is inverted into the bladder "in such a way that mucous membrane will face the bladder, while the raw connective-tissue surface will face itself and come easily together at the level of the bladder-wall, while the innermost edges

project as a tube into the bladder-cavity."

While traction upon these threads is gently maintained, and *before* the frill is inverted, a fine-silk suture is carried round it just above its extremity; this passes through the connective tissue, but must carefully avoid the mucous mem-

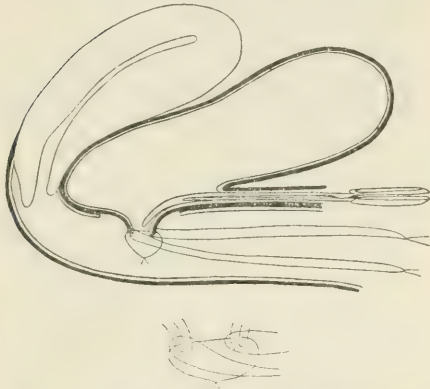


Fig. 1.—The flap has been separated and turned into the vagina; two guiding threads are shown in position, and the first uniting thread, which passes only around through the connective tissue and muscular coat, avoiding the mucosa. A pair of bent forceps is passed through the urethra, its point entering the vulva through the fistula. The guiding threads will be turned up into the vagina and their knots placed between the jaws of the forceps. (*Stanmore Bishop.*)

brane. This is now cut short, the frill inverted, and the guiding threads divided and drawn out through the urethra. In Fig. 3 the repaired fistula is seen from the vaginal side.

The advantages are: (1) absence of tension upon the uniting surfaces; (2) mucous membrane is alone opposed to the action of the urine; (3) the cubic capacity of the bladder is not much decreased, as in other operations for a similar purpose; (4) the sutures are separated from the bladder-contents by the mucous membrane in its entire thickness. *Stanmore Bishop* (*Trans. Med. Soc.*, vol. xx, p. 123, '98).

In the second class of cases not only must the vaginal opening be closed, but

the abdomen must be opened and the source of offense removed, whether it be organ or tissue. In some cases the removal of this source of offense will suffice, and the vaginal fistula may be closed by a subsequent operation should it fail to heal after the irritating cause has been removed. In either class of cases a series of operations may be required, and great patience and skill will be demanded if a cure is to be accomplished.

Tumors of the Vagina.

The tumors of the vagina, like those of other organs, may be benign or malignant. They may be classified as follows:—

BENIGN.—1. Herniæ. 2. Cysts. 3. Hæmatomata. 4. Non-cystic growths. 5. Foreign bodies.

MALIGNANT.—1. Carcinomata. 2. Sarcomata.

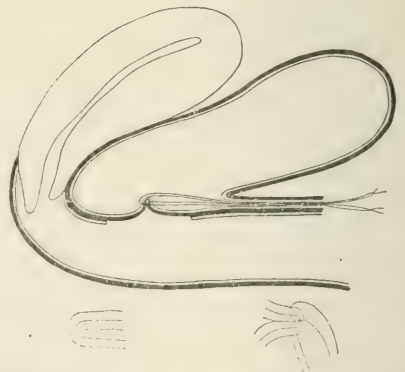


Fig. 2.—The guiding threads have been drawn through the urethra, pulling the circular flap or frill into the bladder. The first uniting thread has been drawn tight and knotted, closing the upper extremity of the frill. This is shown also in enlarged detail. The two uniting threads are shown tied, and the frill thus closed above and below. (*Stanmore Bishop.*)

Herniæ.

Diagnosis.—Hernia of the rectum, or rectocele, is determined by the finger or sound in the rectum, which readily de-

fects the pouch in the vagina formed by the prolapsed organ. Hernia of the bladder, or vesicocoele, is similarly determined by a sound within the bladder. Prolapse of the vagina is often associated with one or both of these forms of hernia, and the distinction between the two conditions is often overlooked even by gynæcologists of skill and ability. Hernia at the top of the vagina is determined by the presence of a soft, painless, movable tumor, which, by combined palpation through the vagina and the abdominal wall, may be recognized as a process of the intestine.

Etiology.—Herniæ within the vagina may be due to descent of the bladder, rectum, or intestine. The first two are usually the result of parturition, and are especially common with those who have borne many children, who work hard, and bear heavy burdens. In the third form the intestine descends through the top of the vagina after the uterus has been removed, or an incision has been made in the anterior or posterior fornix. In rare cases a prolapsed intestine in Douglas's pouch has been forced through the vaginal fornix by a sudden impulse or by continued straining independently of any surgical procedure.

Treatment.—Relief to these conditions involves surgical measures. Those which were mentioned in the description of prolapse of the vagina may be used for the cure of rectocoele and vesicocoele, while for the hernia at the top of the vagina the patient may be placed in the left lateral posture with the hips elevated. The tumor can then be reduced, if possible, with the finger. A sufficiently large portion of the prolapsed vaginal mucous membrane is then dissected away; the sac of the hernia opened, cleared by careful manipulation of its contents, if it has any, and cut away;

the edges of the peritoneal stump brought to the edges of the vaginal wound; and the tissues all closed with interrupted sutures, worm-gut being preferred for this purpose. Instead of this method, one may follow Thomas's recommendation: open the abdomen, draw back the prolapsed omentum or intestine out of the sac, draw back and excise the sac, and close the wound with silk or catgut. After this the prolapsed portion of the vagina may be excised and the wound sutured.

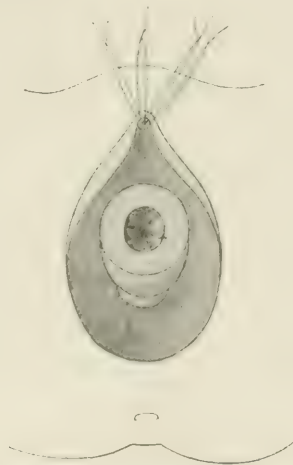


Fig. 3 shows the appearance of the reformed bladder from the vagina. The guiding threads are shown issuing from the meatus. (*Stannmore Bishop.*)

CYSTS.—*Symptoms and Etiology.*—Cysts of the vagina are not of frequent occurrence. They may occur singly or there may be several on one or both vaginal walls. They may be retention cysts containing lymph or mucus, to which blood may have been added by rupture of contiguous vessels. Purulent degeneration may be a subsequent stage. An abscess forming a cystic tumor of the vagina may also result from a hematoma, or from a tumor within the pelvis (pelvic abscess, cyst of the broad ligament, etc.)

which communicates with the vagina by means of a sinus or fistula.

Literature of '97-'98-'99.

Histological examinations have shown that cysts of the vagina may be classified as follows: (a) inclusion cysts; (b) cysts of embryonic-tissue origin; (c) cysts of glandular origin.

(a) Inclusion cysts, due to the epithelium being included within the raw surface, follow a traumatic lesion of the vagina. This is the most probable origin of cysts found on the posterior wall of the vagina, though a cyst of such origin may occur in any portion of the vagina.

(b) Cysts of embryonic-tissue origin are most probably due to either the fetal remains of a portion of the lining epithelium of a Wolffian duct or to a dilatation of the duct itself, the most likely position for cysts of such an origin being upon either lateral wall.

(c) Cysts of glandular origin are due to the dilatation of one or more glands of the vagina. If von Preuschen's theory of glands be accepted, then the dilatation may be considered to have taken place in the branching portion of the glands. J. E. Stokes (Johns Hopkins Hosp. Reports, vol. vii, '98).

These cysts seldom attain any great size, and they are not usually painful except when connected with severe lesions of the pelvic organs.

Literature of '97-'98-'99.

The size of cysts of the vagina varies from that of a pea to a small orange. Those cysts which are larger are generally found to have arisen without the vaginal tissue. The most common locations are the posterior wall, about the median line; the lateral wall, upon either side; in the sulcus formed by the junction of the posterior and lateral walls; and the anterior wall, in the suburethral area. The appearance of the cyst *in situ* is of importance, as it not only aids in showing the etiology of the cyst,—cysts without the vaginal tissue being more apt to be conical in shape,—but aids in making the differential diag-

nosis. The vaginal mucosa may be smooth or thrown into ridges. The smaller cysts generally resemble a white grape, but may be of a dark-brown color, the larger ones being generally of a dark, opaque color. The walls may be thin or markedly thickened.

The smaller cysts of the vagina seldom, if ever, give rise to any symptoms. The larger cysts may produce painful and frequent urination, painful defecation, dysmenorrhœa, dragging pains in the back, difficult locomotion, or dyspareunia. If decidedly large they may obstruct labor. A diagnosis is generally made without difficulty. The possibility of connection with the bladder or rectum or the presence of a hernia should always be borne in mind. J. E. Stokes (Johns Hopkins Hosp. Reports, vol. vii, '98).

The positive diagnosis of cysts can always be corroborated without the least danger (if the ordinary necessary aseptic precautions are taken) by the use of the hypodermic syringe. With cysts simulating cystocele (if the hypodermic is used for differential diagnosis), due care must be observed to avoid aspirating the bladder by passing directly through the cyst into the cavity. This may be avoided by introducing a sound into the bladder to determine the relative thickness of the suspected tissue. When the tumor is on the posterior wall, the index finger is introduced *per rectum* and the thumb *per vaginam*; and all the structures between can be easily distinguished. Herman L. Collyer (Amer. Medico-Surg. Bull., Apr. 25, '99).

Treatment.—The uncomplicated cysts may be ligated at their base and excised, or if too deep seated for ligation, they may be exposed by incision in the vagina and dissected out, the wound being then carefully closed. If connected with a tumor of the pelvis, of course this must be removed as a preliminary to their removal.

HÆMATOMATA.—Hæmatomata of the vagina are rare. It has been said that they sometimes result from a thrombus, but a thrombus in a vaginal vessel fol-

lowed by a rupture and blood-tumor, while conceivable perhaps as an accident of labor, is at least improbable. As a result of pressure or bruising or violence with instruments during labor it is quite possible, but I do not remember to have seen such an accident nor the record of such.

Accidents of other kinds are accountable for this condition, such as violent coitus, masturbation with wooden or metallic substances, falls astride a fence or a chair, or thrust with any hard substance or thing in a violent manner. It is possible also as an accompaniment of purpura hæmorrhagica. No age is exempt from such a tumor. It may be little more than an ecchymosis or slightly elevated effusion, or it may occupy a large portion of the vaginal tube. The hæmorrhage which causes such a tumor is usually self-limited, the pressure of the surrounding tissues being sufficient to check it.

Treatment.—There is little to be done in the way of treatment; the fluid contents of the tumor are usually absorbed if they are not disturbed. Should purulent degeneration take place, the tumor would be converted into an abscess, and would require to be treated as abscesses in other locations are treated. Rest in bed will favor absorption and may prevent degenerative changes.

NON-CYSTIC GROWTHS.—Benign neoplasms of this class are most frequently fibroids or outgrowths from the mucous membrane. Lipomata have been reported, but they must be exceedingly rare. Fibroids may be either sessile or pedunculated. They are always sessile in their early history. They may be projected into the vagina from the uterus or they may originate within the vagina. They are seldom larger than a walnut or a small egg, and are not painful. They

may be pure connective-tissue growths or they may contain muscle-elements. Little is known as to the causation of such growths.

The mucous-membrane growths are always pedunculated; they may be single or multiple, are always painless, but may give rise to hæmorrhage and a mucoid or muco-purulent discharge; they are seldom larger than a pea. The treatment consists in ligation and exsection of the polypi; incision and enucleation of the sessile tumors.

Fungous growths of the vagina have been described, but must be exceedingly rare. Garrigues ("Diseases of Women," p. 349, '97) describes two forms of these growths which usually occur among pregnant women. They are known as *Leptothrix vaginalis* and *Oidium albicans*. Their principal symptom is itching, this being especially the case with *Oidium albicans*. The vaginal mucous membrane with this disease is red and inflamed, and studded with small, whitish growths similar to those which are seen in the mouths of children afflicted with the same fungus. The distinguishing characteristics of the two fungous growths are to be determined, of course, with the microscope.

Treatment.—For treatment the nitrate-of-silver solution (10 per cent.) or a 10- or 15-per-cent. solution of sulphate of copper or of acetate of lead may be swabbed freely over the vaginal mucous membrane, daily until the latter has regained its normal condition and appearance.

Foreign Bodies.

Of course, these are not really tumors, but they may become fixed in the vagina and be more or less surrounded by new tissue and so become essentially tumors. They may consist of hair-pins, pieces of glass, pessaries long neglected and over-

looked, and a great variety of other substances. They are often introduced for the purpose of masturbation, and sometimes from mere perversity on the part of the patient. They may excite intense inflammation. In some cases they form a focus from which malignant disease develops. They may cause intense pain, and their removal may be very difficult. In some cases they may be removed with forceps; in others they must be removed by dissection.

Literature of '97-'98-'99.

There are three hundred and sixty-four cases on record in which deleterious results have followed retention of vaginal pessaries. In many cases the instruments have grown into the vagina or have become incrustated or produced perforation and have been removed with difficulty. The use of Gigli's wire saw is suggested in the removal of such retained pessaries. An aneurism needle threaded with silk is carried about the pessary, the saw is tied to the silk, by means of which it is then drawn around the pessary. Max Madlener (*Centralb. f. Gynäk.*, Oct. 1, '98).

Malignant Growths.

Of malignant growths of the vagina sarcoma is very rare. It consists in an infiltration of the vaginal wall, is very painful, and its presence can only be determined by excision of a portion and its examination by the microscope.

As it occurs in children, primary sarcoma of the vagina does not, in the majority of cases, run a very rapid course. It does not ulcerate very readily. It does not usually affect the lymphatic glands. It does not disseminate, but its prognosis is very grave. It recurs quickly after removal, and it kills by interfering with the action of the pelvic organs, by retention of urine more often than by obstruction of the bowels. The diagnosis is easy, but the polypi are often looked upon as innocent growths, and their true nature remains unrecognized until the

presence of a tumor in the pelvis shows that it is too late for surgical interference. D'Arcy Power (*St. Bartholomew's Hosp. Reports*, vol. xxxi, '96).

Carcinoma is also, for the most part, an infiltration process. It may be an extension from carcinoma of the uterus; in fact, the disease rarely originates in the vagina. The tissues involved may be hard or soft, and they bleed readily and profusely. This condition is sometimes caused by the irritation of a pessary or some other foreign body in the vagina.

Primary cancer of the vagina is not so rare as supposed, upward of one hundred and thirty cases having been recorded. The circumscribed, papillary variety offers the best prospects for operative interference, and is situated most frequently on the posterior wall. Friedl (*Wiener klin. Woch.*, No. 3, '96).

Treatment.—The treatment for both these diseases consists in early and extensive removal with knife, scissors, or actual cautery. In some cases the diseased tissue can be removed only by scraping with the sharp curette. Recurrence is almost certain to take place unless the entire growth is removed in its incipency.

Absence and Defects of Structure.

The vagina may be congenitally absent or it may be entirely occluded as the result of disease or surgical operation. Congenital absence is rare; it signifies arrest in the development of Müller's ducts during embryonic life from causes of which we know very little. It may co-exist with perfect development of all the other genital organs.

Literature of '97-'98-'99.

Twenty-six cases with rudimentary development of Müller's ducts have been collected in which the ovaries were removed to relieve menstrual molimina. In all but 2 the breasts and external

genitals were fully and normally developed; in 1 of these there was simply a deficiency of fat-tissue in the labia majora and minora. In 11 cases the urethra was of unusually large calibre, readily admitting the index finger; and in these there was total absence of the vagina. H. N. Vineberg (Amer. Jour. Obstet. and Dis. of Women and Child., Oct., '98).

Inflammatory disease of the vagina (erysipelas, diphtheria, sequelæ of severe labor, etc.) may cause extensive sloughing and exfoliation of the mucous membrane, followed by complete adhesive union of the anterior and posterior walls.

Literature of '97-'98-'99.

Acquired atresia of the vagina may be caused by difficult, especially tedious, labor, falling astride, injuries from foreign bodies, burns and scalds, syphilis, vaginal diphtheria, variola, and possibly pneumonia, yellow fever, and typhus. Kummer (Corres. f. Schweizer Aerzte, Jan. 1, 15, '99).

Complete closure by surgical procedure has been recommended for certain diseased conditions, *e.g.*, for extensive and inoperable vesico-vaginal fistula,—the menstrual fluid being discharged through the bladder. There are no troublesome symptoms with congenital absence of the vagina if there is also absence of the ovaries. There are no symptoms before puberty in any case, as a rule, nor after the menopause. Trouble, difficulty, is usually due to the accumulation of menstrual blood within the uterus, a tumor being formed which may be of considerable size. I have seen it extend nearly to the umbilicus in a girl of 16.

The pain of such a tumor is more or less constant, but becomes worse with each accession of blood as the menses recur.

Treatment.—The treatment consists in opening the uterus, evacuating its

contents and preventing their reaccumulation. In a case of absence of the vagina under my observation I was obliged to evacuate the contents of the uterus through the rectum, then, with a sound in the uterus (through the opening in the rectum) as a guide the perineum was in part torn and in part cut through until the uterus was reached. The home of the patient was in a distant town, and the false opening was unfortunately allowed to heal. The menstrual blood reaccumulated and the tumor recurred, I therefore felt justified in removing the ovaries subsequently producing, by gradual cutting and dilating, a vaginal orifice about two and a half inches long, which has persisted and is apparently lined with mucous membrane. The health of the patient is now (five years since the operation) very good, and she has been able to earn a living in a useful occupation for a long time.

The transplanting of flaps, obtained from prolapse operations on otherwise healthy women, to the granulating sides of the artificial vagina in cases of complete atresia suggested. First an opening is made between the labia in the position to be occupied by the new vagina, and then with a finger or a blunt instrument an opening is dissected up to the external os or through it if the cervical canal has been occluded. The cavity thus formed is tamponed with iodoform gauze, and kept distended in this way until the whole surface is covered with healthy granulations. Then transplanting may be done in one sitting or in several. Great care is necessary in the preparation of the flaps; they must be quite thin, of uniform thickness, and removed with great care not to injure the vitality of their tissue. The flaps, as soon as dissected off, are laid with their raw surfaces together in a warm sterile vessel until they may be used. After the flap or flaps have been fitted to the granulating surface they are intended to cover, they are kept in place with a tampon for ten days, during

which time the patient must be at absolute rest in bed. A. Mackenrodt (Centralb. f. Gynäk., No. 21, '96).

Literature of '97-'98-'99.

In congenital absence of the vagina operation to establish an artificial vagina should be performed, even if no uterus is present and no retained menstrual fluids require evacuation, for the sake of the mental impression upon the patient, as well as when she can be rendered normal by the operation. For, when this is not performed, coitus will be performed through the urethra. Latouche (Archives Prov. de Chir., No. 4, '97).

Opening of the peritoneum during the operation for absence of the vagina is rather counseled than dreaded, as it enables the operator to find the uterus easily and at once. P. Walton (Belg. Méd., Sept. 22, '98).

In congenital absence of the vagina, a crescentic incision is made across the interlabial space, with its concavity upward, thus getting a little shelf of mucous membrane below the urethra to divert the escaping urine. By blunt dissection a free cellular space is created between the bladder and the rectum, to the depth of five inches. This is temporarily packed with sterile gauze. Thiersch skin-grafts are cut from the thigh sufficient to cover well an ample plug made thus: A thin French rubber pouch is sterilized by boiling and is stuffed with long strips of iodoform-gauze to its full capacity. Upon this the skin-grafts are spread, with their wet sides outward and their edges freely overlapping. Numerous small punctures are made in the rubber after stuffing, so that the gauze-contents will receive any discharge lurking about. A piece of rubber tubing the size of one's little finger, wrapped loosely about with iodoform-gauze, is now inserted into the rectum, with the view of permitting free exit of gas during the subsequent days of enforced constipation. Finally the graft-covered form is carefully passed into the new vaginal space, the walls of which are held apart by three deep retractors, which on removal allow the fresh surfaces to come into closest contact with

the wet surface of the grafts. To prevent the plug from being in the least displaced, two silk-worm-gut stitches are passed across the vulva, transfixing the gauze-packed tampon, and are tied over iodoform-plugs at either side. For four weeks the patient is kept recumbent, the vagina being packed with gauze liberally smeared with lanolin, and afterward, when the new skin is quite tough, being dilated daily with large vaginal plugs and bougies, which are worn for a few hours at a time. Inevitable stenosis by cicatricial contraction reduces the original canal to smaller proportions; hence, it should be made more than ample in the original design. Robert Abbe (Med. Record, Dec. 10, '98).

Defects in the vagina may also be congenital or acquired. The former may consist in a small or imperfectly developed tube and in one or more septa dividing the vagina into loculi. These septa may extend the entire length of the vagina, they may be attached to the portio vaginalis uteri at or near the os, or they may avoid the uterus entirely. Sometimes they extend across the vagina like a secondary hymen.

Acquired defects of the vagina may consist in narrowing or atresia after unsuccessful operations, after inflammatory diseases with sloughing or necrosis, after severe labor, after cauterization from heat, acids, etc., as the result of injuries or the infiltration of a malignant disease process, and as the consequence of atrophy which comes with age or the premature appearance of the menopause.

Atresia, which comes with old age or the premature menopause, is usually irremediable. When it is due to other causes it may sometimes be overcome by the judicious use of dilating instruments and the cutting of bands and strictures.

Diseases of the Vulva.

No age or condition of life is free from disease of this structure. The relatively greater prominence of the vulva in child-

hood compared with mature life renders it the more exposed to disease and injury; hence the not infrequent instances of suffering, as to the vulva, in little children from accident, want of cleanliness, parasites, etc.

Vulvitis.

This general term includes a variety of inflammatory conditions with more or fewer elements and symptoms. It may signify merely an inflammatory condition of the skin, an inflammation of the subcutaneous connective tissue, an inflammation of the vulvo-vaginal glands and the tissue surrounding them, or an inflammation of the mucous membrane contiguous to the vagina.

The varieties of vulvitis may be classified as (1) traumatic and (2) infectious.

Symptoms.—Symptoms which attend traumatic vulvitis are those which attend similar injuries in other parts. If the skin is not broken or bruised, ecchymosis will mark the injured surface, and at a later stage, if suppuration has occurred, fluctuation will be apparent. Pain is almost always a prominent symptom, arising from pressure if an effusion of blood underneath the skin renders the tissues tense, or attributable to direct injury to the nerve-endings if the actual or potential cautery has been used, or due to bruising of the tissues and subsequent inflammatory reaction in connection with lacerated and contused wounds.

Hæmorrhage may be external or internal, that which proceeds from the venous plexuses, with which the vulva is richly supplied, being sometimes very profuse. Swelling is usually a conspicuous symptom, the swollen tissue being soft and compressible when the bleeding has taken place within the loose tissues of the vulva, or hard and firm when due to inflammatory exudate; it gradually sub-

sides as absorption takes place or the fluid is released by incision.

Suppuration occurs not infrequently, for the tissues are vascular; cellular tissue is prone to suppurate, while the secretions of the vulvo-vaginal glands, if retained, during the inflammatory process readily undergo degenerative changes. Uncleanliness and want of care in the treatment of traumatisms of the vulva will predispose to suppuration here as elsewhere.

There is no discharge from the mucous surface of the vulva during the acute stage of this condition, the glandular secretions being checked. As the acute inflammatory symptoms subside, however, the mucous membrane becomes moist again. The constitutional impression from this condition varies with the individual; robust women and children show little febrile reaction, while those who have poorer resisting power may suffer much. If the wound becomes infected, enlargement of the inguinal glands and general disturbance may follow.

A traumatic inflammation of this character if treated antiseptically may show acute symptoms three or four days, the exudate, if there is any, disappearing in two or three weeks. Should the treatment be defective, the duration of the disease may be indefinitely prolonged.

Etiology.—The question of infection enters so largely into the consideration of all inflammatory conditions that it is often argued that the non-infectious conditions are few and not easily differentiated, or even that they do not exist. While it is almost impossible to say that infectious elements are wanting in certain cases of vulvitis, we can at least point to traumatic factors as dominating and originating. Traumatism in this, as in every other part of the body, may be

accidental or intentional. It may consist in any kind of a wound or bruise and be followed by more or less intense symptoms of inflammation. Among the accidents which cause vulvitis may be mentioned falls astride a chair or fence, thrusts from sticks or implements of wood or metal, applications of various forms of caustic material (mineral acids, chloride of zinc, etc.), heat from boiling water, from the flames of burning clothes, etc., the horns of angry animals, bites and stings of insects or other animals, etc.

The *intentional* traumatisms which produce vulvitis are the wounds which are inflicted by the surgeon with knife, the actual or potential cautery, also the wounds which are due to violence and brutality, kicks, rapes, violent coitus, self-inflicted injuries, and many others.

Pathology.—The pathology of traumatic inflammations of the vulva is seldom obscure. If the lesion involves the skin alone it will be very difficult to cleanse it and keep it clean, for it is often the seat of parasites; it is often bathed with offensive and irritating secretions, and it is frequently soiled by menstrual blood, urine, and even feces. It is not easy to eliminate the conditions which result in infection from such a tissue.

The subcutaneous tissue—rich in fat, cellular tissue, and vessels—shows the same tendency to inflammatory reaction, which is ordinarily shown by cellular tissue or highly-nourished erectile tissue. Wounds in this location, therefore, not infrequently suppurate, and suppuration and sloughing are not without danger, for there may be profuse hæmorrhage from large venous plexuses, or general infection through opened veins and lymphatics.

The large glands on either side of the vulva which secrete the lubricating fluid

for the vulvar mucous membrane may bear no unimportant share in traumatic vulvitis. They may undergo direct injury and the duct be closed in the inflammatory condition which follows, or the inflammation of the surrounding tissues may be communicated to them. The secreting function of the glands may be destroyed, scar-tissue taking the place of the normal glandular tissue. In other cases the obstruction of the duct may simply lead to the formation of a cyst, which will be filled with the retained glandular secretion.

Complications.—Phlebitis and lymphangitis are among the rarer complications of this condition, the possibility of their occurrence should constantly incite to the adoption of the utmost care and cleanliness in any plan of treatment which may be followed.

Treatment.—The treatment should be such as modern asepsis and antisepsis inspire in the treatment of all traumatic inflammations, the basis being cleanliness. If pain is severe, a vulvar pad, secured by a T-bandage and kept moist with the lead-and-opium lotion (U. S. P.), may be used. Irrigation two or three times daily with hot saline solution (100° to 110° F.) or with boric acid (10 per cent.), carbolic acid (2 per cent.), Thiersch's solution, or peroxide of hydrogen will favor the healing process. Extensive wounds must be cleansed, trimmed, and sutured with the same care which would be used if they occurred in other parts of the body, burns may be dressed with vaselin, carron-oil, or other approved substances, the serum from large vesicles being carefully withdrawn, and pain relieved by hypodermics of morphine ($\frac{1}{8}$ grain) and atropine sulphate ($\frac{1}{120}$ grain). Abscesses and retention cysts must be evacuated, care being taken to avoid opening the venous

plexuses on either side of the vulva. If there should be elevation of temperature (102° or higher), quinine in 10-grain doses may be given at night with especial reference to its sustaining and tonic effects. The bowels must be kept open, fluid extract of cascara, 1 drachm at night, or any other approved cathartic being used. The diet must be composed mainly of fluids. Rest in bed is desirable, and if these hygienic precautions are observed the active course of the disease may not exceed a week.

It is desirable to continue the vulvar dressings and irrigation and abstain from coitus or fatiguing work as long as any pain, swelling, or induration persist.

Infectious Vulvitis.

By far the greater number of cases of inflammation of the vulva are of infectious origin.

This statement seems reasonable enough when we realize that the skin and mucous membrane are always the abodes of organisms which only await favoring conditions to become noxious. The vulva is also the most vulnerable location for infection by the organisms peculiar to venereal disease, and the number of cases of such disease is beyond computation. Filthy habits, uncleanliness, and carelessness are also responsible for many cases. The following varieties are suggested:—

- | | |
|------------------|--|
| 1. Venereal | $\left\{ \begin{array}{l} \text{Gonorrhœal.} \\ \text{Chancroidal.} \\ \text{Syphilitic.} \end{array} \right.$ |
| 2. Parasitic. | |
| 3. Eczematous. | |
| 4. Tuberculous. | |
| 5. Diphtheritic. | |

Few forms of disease to which women are susceptible are more common than venereal vulvitis. I have chosen the subdivisions of this disease which are ac-

cepted in the nomenclature of venereal disease in men, though it is certainly doubtful, in many cases, whether the so-called chancroids exist independently of the gonorrhœal bacterium (gonococcus).

Symptoms.—In each of the forms of venereal vulvitis it must be remembered that we have, as a rule, a section or fragment of a more extensive disease. The symptoms may be limited to the vulva during the initial period, but they are not likely to remain thus limited.

Gonorrhœa in its relation to the vulva presents acute inflammatory symptoms, the tissues being hot, dry, and swollen from three to seven days, after which they are soiled with a more or less purulent secretion. There may be no eruption upon the skin or there may be a crop of warty growths sometimes few in number, sometimes abundant, not limited to any particular spot or area, but often more abundant near the posterior commissure than elsewhere. They are painless, and vary in size from a pin's head to that of a small cherry. Other developments are the soft chancroidal sores sometimes limited to the fourchette or the mucous membrane of the vulva, and sometimes covering the whole vulva with a disgusting accumulation of discharging ulcers. Like the venereal warts, these are seldom painful except as the ulcerated surfaces on opposite sides are rubbed against each other as the patient moves about.

A very common accompaniment of gonorrhœal vulvitis is the inflammation of the vulvo-vaginal glands. The infective process extends from the duct to the structure of the gland, the duct being occluded in some instances, while in others it is the avenue for the escape of exuberant secretion. Suppurative inflammation, as already observed, is not unusual.

In syphilitic vulvitis the initial lesion may be on any portion of the skin or mucous membrane. It is not always easy to find it, for it (the Hunterian chancre) may be very small and without well-marked distinguishing characteristics. It is often hidden within the navicular fossa or on the inner side of the vulva, and may be overlooked without a very careful search. Acute inflammatory symptoms apart from those which proceed directly in connection with the sore or sores are not frequent, and may not appear in the vulva at all. The neighboring inguinal glands may be enlarged and painful, but they are not thus affected invariably. The erythematous eruption of syphilis is often seen upon the skin of the vulva, while the ulcerative lesions of the late periods of the disease are relatively rare.

Etiology.—The cause of this disease is, of course, the specific poison of one or the other infectious condition alluded to in the table. Chancroids and gonorrhœa are very frequently associated, as already observed, if, in fact, they are not identical. Syphilis and gonorrhœa are less frequently associated, but the combination is not very rare. This disease results almost solely from coitus. I have heard the usual stories of communication by means of towels and water-closet seats, but such a method of inoculation is apt to be questionable. The disease may occur at any age. I have seen it in the little child and in the toothless dame of three score and ten. The tissues of women between the ages of 20 and 30 are the most susceptible to its influence. In very young children the poisonous agent is often conveyed by the hand of the infected mother when the child is washed or dressed, or it may come from contact with an infected father or mother while in bed at night.

Pathology.—The pathology of gonorrhœal and syphilitic vulvitis is that of gonorrhœa and syphilis, in which an intensely infectious agent is communicated directly to the skin or mucous membrane. It is not necessary that the tissue be abraded to insure inoculation, though it occurs more readily, of course, through a broken than through an unbroken surface. The active agent of infection in gonorrhœa is the gonococcus of Neisser: a diplococcus, or biscuit-shaped microbe, of considerable vitality and good powers of reproduction and found upon the exterior as well as the interior of epithelial cells.

The essential bacterium of syphilis has not yet been isolated.

Treatment.—The treatment of these diseases consists, first of all, in cleanliness, frequent ablutions or douchings with hot water (100° to 110° F.) being desirable. For local applications nothing will surpass the frequent and liberal use of a 10- to 20-per-cent. solution of nitrate of silver, the entire affected surface being freely covered with it. Quite recently protargol has been introduced as a substitute for the silver salt, but it is doubtful whether anything will entirely supersede a remedy of such tried efficacy. For internal treatment a ferruginous tonic may be given or a combination of quinine, strychnine, and gentian. The well-known elixir of iron, quinine, and strychnine is very efficient, and the proportions of the different drugs may be varied to suit individual requirements. If syphilis is present, the mercurial treatment will be indicated. I know of nothing better than the protiodide in $\frac{1}{8}$ -grain pills, given three or four times daily until the limit of tolerance has been reached. Local lesions must be kept clean and treated daily with the nitrate-of-silver solution.

Parasitic Vulvitis.

Symptoms and Etiology.—Various degrees of inflammatory disturbance are excited by parasites which infest the vulva. In children, worms (*lumbrici*, *ascarides*) whose habitat is the rectum, sometimes migrate to the vulva and cause much uneasiness and more or less inflammation.

Pediculi pubis are very common among those who have attained puberty, the hair-follicles upon the labia and mons veneris being attacked. Intense itching, with consequent scratching and rubbing, results. The inflammatory reaction is very decided, the vulva being sometimes converted into a mass of suppurating sores.

Treatment.—The treatment involves cleanliness and great gentleness of manipulation. Irrigation with a 2-per-cent. solution of creolin should be practiced twice daily. The hair of the vulva should all be carefully clipped away, and the entire surface freely anointed with mercurial ointment (*unguentum hydrargyri*). After the parasites have been destroyed the inflamed surface may be kept constantly covered with the official zinc ointment until complete healing has occurred.

Eczematous Vulvitis.

Symptoms and Etiology.—This condition occurs more frequently among those who have passed the menopause than at earlier periods; indeed, I have seldom seen it in those who have not reached the change of life. It is usually associated with a vaginitis in which there is an acrid discharge soiling the vulva and producing irritation especially during cold weather and at night when the patient is in bed. The itching in such cases becomes almost intolerable, this being the well-known *pruritus vulvæ*.

Scratching and rubbing cause great disturbance in the skin, which may become dry and hard, like parchment, or may exude a serum which excoriates the skin and adds to the discomfort. It is not improbable that poisonous germs from dirty finger-nails are frequently communicated in this disease, thus complicating the condition. The suffering may be so great as to cause hysteria or even insanity.

Treatment.—The treatment consists, first of all, in cleanliness and abstinence from scratching. The entire inflamed surface should be covered with a paste made from subnitrate of bismuth rubbed up with glycerin (sufficient glycerin being combined with sufficient bismuth to make a rather thick paste, which will adhere readily to the skin, but will not run), this being applied freely and frequently, and the vagina plugged with cotton-wool moistened with the same mixture. This treatment, in addition to vaginal douches sufficiently astringent (tannic acid, alum or hydrastis combined with hot water), and cathartics at night (compound cathartic pills, 1 or 2; or fluid extract of cascara, 1 drachm) will usually bring the disease under control and must be continued as long as any symptoms remain. Of course, much will depend upon the care and skill with which the local treatment is administered and the persistence with which it is continued.

Tuberculous Vulvitis.

Symptoms.—This form of disease—manifested by tubercular sores, not the so-called tubercular eruption of syphilis, but that in which there is a true tubercular process developed by tubercle bacilli—is of occasional, but not frequent, occurrence. It is characterized by a painless ulcerative eruption of the labia, especially the labia majora, which shows

the usual features of tubercular processes: sloughing, want of tendency to heal readily, and scarring and contraction after healing. It is probably identical with lupus of the vulva, which has been described by many writers, but not always with the same pathological idea in view.

Treatment.—The treatment should be a general tonic one, with the administration of iron, codliver-oil, strychnine, and an abundance of wholesome food; locally cleanliness is to be scrupulously observed and the use of astringent ointments. The following formula is suggested:—

R Creasoti, $\frac{1}{2}$ drachm.
Ichthyol., $\frac{1}{2}$ drachm.
Ung. zinci ox., 1 ounce.

M. Sig.: Apply freely.

Diphtheritic Vulvitis.

There is in this form of vulvitis a true inflammatory process of infectious origin identical with that which is characterized by a deposit of exudative material or false membrane upon mucous surfaces in general (*e.g.*, upon the pharynx, intestine, or uterus). It sometimes occurs in little children as an accompaniment of croup and diphtheria, or with the eruptive fevers. It may occur in women as an accompaniment of diphtheria, though this is rare in adults, or it may occur as one of the phenomena in puerperal septicæmia; in other words, it is a phenomenon which rarely occurs alone. It is of grave importance, for it signifies profound toxæmia and a gloomy prognosis.

The general treatment which is advised includes inhalation of oxygen, internal use of chlorine-water and general supporting measures. The local treatment requires the greatest caution and delicacy of manipulation, and usually in-

volves also the treatment of a similar condition in the vagina and uterus. Cleanliness must always be most scrupulously observed, no portion of the diphtheritic membrane being allowed to soil the tissues contiguous to the vulva. In children and virgins it is desirable to avoid entering the vulva, but a pad of absorbent cotton may be kept constantly in contact with the vulva moistened with chlorine-water, or a 10-per-cent. solution of nitrate of silver, or a 5-per-cent. solution of hydrochloric or carbolic acid. For puerperal women and multiparæ in general vaginal douches of creolin (2 per cent.) may be used, with great gentleness, twice daily, while in the intervals the vulvar pad moistened with the 10-per-cent. solution of nitrate of silver, or 2-per-cent. solution of protargol should be constantly applied.

Atrophy of the Vulva.

This condition is the usual accompaniment of age, the hair of the labia becoming sparse and straggling, the labia majora flabby or still somewhat prominent if the supply of fat is abundant, the labia minora small and insignificant, while the vulvo-vaginal glands lose their activity and participate in the general shriveling and abolition of function. This condition may also come prematurely as the result of general failure of nutrition or in consequence of the removal of the ovaries and the resulting premature menopause. It does not by any means occur as a customary result, however, of the early removal of the ovaries.

A rare form of atrophy is that which causes the well-nigh complete disappearance of the labia minora. This was described by Breisky (*Centralb. f. Gynäk.*, p. 358, '85), and by him was called *kraurosis*. Very few cases of this form of atrophy have been recorded.

Hypertrophy of the Vulva.

This condition is a relatively common one. It may involve the labia majora alone, the labia minora alone, or may include both. In syphilis and chancroidal disease we frequently have this condition, the labia majora being more frequently implicated. The degree of enlargement varies; it may be moderate, or the vulva may be four or five times its normal size. The skin is hard and board-like to the feel, a dense infiltration taking place in the skin and cellular tissue. It is painless, without febrile movement, and is usually self-limited; but it may persist for months, yielding as the disease yields to constitutional measures. When the tension in the skin is considerable a few linear, but shallow, incisions will bring relief by depleting the tissues. The use of a few leeches will accomplish the same result. The extensive enlargement of the labia known as elephantiasis arabum is not seen in this country. Its nature is the same as that which has been referred to, but it may be due to an infectious medium other than that of venereal disease.

Hypertrophy of the labia minora is also a very common condition. Among the negroes of Africa it is said that the enlargement is sometimes enormous, the labia hanging down in great folds and masses. A very common cause for this condition is masturbation, the nymphæ being very sensitive and constant friction and traction producing elongation and enlargement. I have never observed that such enlargements caused any particular annoyance, save in one instance, this occurring in a prostitute about 20 years of age, who was syphilitic and an opium-smoker. The tumors were as large as a man's fist and were a decided impediment to coitus. Some of those who saw the case believed the tumors

were of syphilitic origin, others that they were simply inflammatory. They were removed with the cautery-knife, but after a few months the vagina was filled with a recurrent growth. The result is not known.

Varicocele.

Symptoms and Etiology.—This condition occurs not infrequently as an accompaniment of pregnancy. It is, in all cases, an evidence of interference with the venous circulation. The venous supply of the vulva is extensive; hence any condition which causes an increase of pressure in the pelvis may derange the venous circulation. Fibroid tumors of the uterus, tumors of the ovaries and tubes, pelvic abscess, pelvic peritonitis and cellulitis, and subinvolution of the uterus may all cause interference with the venous circulation and result in enlargement in the veins of the vulva. In the later months of pregnancy the enlargement of these veins is sometimes enormous, and the danger of rupture is constantly imminent. Occasionally rupture does occur, either just before or during labor and hæmorrhage, phlebitis, or thrombosis may confront one, with grave possibilities.

Treatment.—The treatment may consist of rest in bed and the use of a pressure bandage upon the enlarged vessels. A pad of absorbent cotton moistened with an astringent solution (tannic acid, alum, or fluid extract of hydrastis) may be worn until the cause of the pressure can be removed; when this has been done the varicocele usually disappears.

Tumors of the Vulva.

Mention has already been made of tumors of the vulvo-vaginal glands (retention cysts, abscesses, etc.; venereal tumors, hypertrophy of the labia, and inflammatory enlargement in general).

The vulva may also be the seat of

furuncles, erysipelatous inflammation, hernia, hæmatoma, and enlargement from various benign and malignant growths. Furuncles should be incised as early as possible, even before suppuration occurs, the incision being repeated should tension become troublesome. Antisepsis and cleanliness need hardly be mentioned as indispensable. For erysipelas rest in bed and the constant use of the ordinary lead-and-opium lotion are indicated. The application of pure carbolic acid at the border of the swelling has been highly recommended as a check to the progress of the disease. The destruction of tissue which is likely to result from the use of this powerful substance must not be forgotten.

Hernial tumor of the vulva may result from prolapse of an ovary or from descent of the intestine through the inguinal or femoral canal into the labium majus. The differentiation of the causes of hernia is not always possible, and when operating for this condition it is well to remember the desirability of returning a healthy ovary to the pelvic cavity. The prolonged ovarian ligament may be shortened by looping it upon itself to prevent recurrence of the prolapse. The Bassini operation offers good prospect of radical cure for hernia in women. Hydrocele of the round ligament will, in some cases, simulate intestinal hernia, and must be distinguished from it in the plan of treatment. The contents of such a tumor are, of course, to be evacuated and a portion of the tumor-wall removed to prevent possible recurrence of the condition. Hæmatoma of the vulva may occur apart from that which occurs with varicocele. It consists in a swelling of one or both labia majora, and is almost invariably the result of traumatism. Rest, pressure, and the application of soothing lotions

form the principal means of treatment. Should abscess occur, it must be treated by suitable surgical measures.

Other benign tumors of the vulva which also are of rare occurrence are fibroma of the round ligament, dermoid, and lipoma. These are to be treated surgically as would be the case should they occur in other parts of the body.

Literature of '97-'98-'99.

Among 420 primary neoplasms of the external genitals in women, Williams found only 17 fibromas, or only about 1 in 600 of all the new growths in women he tabulated. The fibrous and fibromyomatous tumors that are seen in this region may have their origin in two main sources: (1) the subcutaneous connective tissue, and (2) the connective tissue and terminal muscular fibres of the round ligament, and possibly in muscular fibres in the skin, while, as curiosities, may be mentioned tumors arising in [a] the pelvic fascia and periosteum of the bony pelvis, [b] the recto-vaginal septum, and [c] the uterus. Malcolm Storer (Boston Med. and Surg. Jour., Dec. 15, '98).

Malignant disease of the vulva may be either carcinoma or sarcoma, the former being the more frequent. Their clinical differentiation is difficult and sometimes impossible. They present an indurated mass, which is usually very painful and may have numerous ulcerating and discharging areas. The mass develops rapidly, and in a short time the inguinal glands become enlarged and painful. The diagnosis is not difficult, syphilis being excluded.

Literature of '97-'98-'99.

Epithelioma of the vulva is liable to be confounded: (1) with simple vegetations; (2) with lupus of the vulva; and (3) with syphilitic affections; but the first, the simple vegetations, secrete a virulent liquid unlike the ichor of cancer. they readily yield to an energetic caus-

tic which prevents their reproduction, and they have no hardened base, being remarkable for their softness. In the case of lupus, the vulva is red and presents scattered fungous ulcerations which are without any indurated base; while the syphilitic chancre is more limited and has a little circle of characteristic induration. Wilmer Krusen (*Phila. Med. Jour.*, Sept. 2, '99).

Treatment.—The tumor should be removed as thoroughly and as promptly as possible, and my preference is for the cautery-knife for such operations. The hæmorrhage may be very profuse, but it can usually be checked by firm pressure. The tumor is likely to return quickly and should be removed as often as the conditions will warrant it.

ANDREW F. CURRIER,
New York.

VAGINO-PERINEAL INJURIES.

Surgery of the Perineum.—Rupture of the perineum may be described as a splitting of the perineal body, which latter directly or indirectly supports the bladder, rectum, uterus, and the intestines. Various degrees of laceration are described which may be classed under the heads: "Complete" and "Partial Rupture." These include the following degrees of destruction:—

Superficial rupture of the fourchette and perineum, not involving the sphincters.

Rupture to the sphincter ani.

Rupture through the sphincter ani.

Rupture through the sphincter ani and involving the recto-vaginal septum.

Not infrequently subcutaneous rupture of the muscular tissue and fasciæ of the perineum takes place, leaving the skin and mucous membrane intact. These latter are called concealed ruptures, and are followed, as in the other forms, by relaxation of the pelvic floor and loss of perineal support.

Symptoms.—The symptoms of perineal rupture are at first a feeling of weakness and dragging down of the pelvic viscera, and later the prolapse of the various organs resulting, when the rupture is partial, in subinvolution of the vagina; prolapse of the vagina, with cystocele or rectocele; and prolapse of the uterus. When the rupture is complete, to these may be added incontinence of fæces and intestinal gases and prolapse of the rectum. As an exception, the patient may suffer but little even when the two passages are laid into one; but generally the patient's condition is a sad one. Fæcal matter and gases pass without control, and the pelvic organs tend so strongly to descend that exercise, muscular efforts, or tenesmus produce a sense of weariness, pain throughout the pelvis, and traction upon the broad ligaments.

Diagnosis.—The diagnosis of this condition is made by inspection.

Etiology.—The most common cause of laceration of the perineum is parturition through rapid delivery with forceps, unusually large head, or one persisting in the occipito-posterior position; less frequently through some accidental injury, as the passage of large tumors, a fall upon a sharp object, etc.

Pathology.—In partial perineal ruptures there is the exposure of a more or less extensive raw surface, richly supplied with blood- and lymph- vessels, and in close proximity to the intrapelvic and inguinal chains of lymphatic glands. This raw surface is, as a rule, indisposed to heal by first intention and over its surface for two or three weeks there is an uninterrupted flow of a foetid, semi-putrid, irritating fluid consisting of disintegrated muscular tissue, decaying and flaking decidua, disorganized blood, and muco-pus. In complete perineal rupture the presence of fæcal matter and intes-

tinal gases are added. Rupture of the perineum in the puerperal state may lead to septicæmia, anterior or posterior displacement or prolapse of the uterus, cystocele, rectocele, uterine engorgement and hyperplasia, subinvolution of uterus and vagina, loss of power of uterine ligaments, development of a tendency to abortion, an impairment of sexual gratification to the male, and neuralgia affecting the site of the rupture.

Prognosis.—When the rupture is incomplete and of slight extent and only a small portion of the perineal body is involved, symptoms may be lacking and no evil follow. In first labors laceration of this kind and extent is the rule, and not the exception, and interference is not necessary. The first and second degrees of laceration mentioned above are often without evil consequences, and may be unknown to patient or physician unless through careful inspection; this is not the rule, but the exception. The third degree is always a grave accident. The fourth degree is the most serious form. The more serious the laceration, the less chance there is of spontaneous recovery and the more probable the complications and evil results before mentioned. Proper repair of the rupture is always productive of great gain to the patient.

Treatment.—Every perineal laceration should be closed by suture immediately after the expulsion of the placenta whenever the rent seems large enough to demand repair, for the purpose of securing primary union, if possible. Rare exceptions to this rule might be made in cases of extreme exhaustion or where there is no chance of immediate union on account of the bruised condition of the parts. The worst cases of laceration usually follow instrumental or manual delivery, and may be discovered while the patient is yet profoundly anæsthetized. The cir-

cumstances are propitious for an immediate operation, which, if successful, will save the patient much suffering, while failure will not make her condition worse. The obstetrical bag should always contain needles and sutures for this operation. T. Gaillard Thomas notes three factors which may tend to defeat the success of immediate operation: hasty operation; entrance of the lochial discharge into the wound; failure to close the upper portion of the perineal body, leaving a pouch for the accumulation of putrefying materials and leaving the anterior vaginal wall and bladder without support.

If failure of primary operation ensue, a second operation should not be done before the results of parturition have disappeared,—say, not less than two months.

IMMEDIATE OPERATION.—The old method of immediate operation was to introduce the first suture at the lower angle of the rent, and the last one at the posterior commissure, passing them as deeply as possible to include the whole of the torn surfaces. T. G. Thomas of late years has advised another plan. He takes a strong curved needle, at least three inches in length, threads it with strong sublimated silk, and passes it from a point corresponding to the upper margin of the rent on one labium downward and backward above the upper angle of the laceration in the posterior vaginal wall and out again at a spot corresponding to the point of entrance on the opposite labium, keeping the suture carefully concealed. The wound having been thoroughly cleansed by irrigation or sponging with a 1 to 5000 sublimate solution, this single suture is securely tied; in this way the floor of the vagina is at once closed, and the remaining perineal wound shut off from contamination by blood oozing from the uterus. Usually, now not more than two other comparatively superficial stitches

have to be passed, care being taken that the deep portions of the wound are included and approximated when the sutures are tied. It is claimed for this operation that it is very easy of performance, requires but a few minutes, and is well borne even by very much exhausted patients. The sutures are usually removed between the fourth and seventh days, when they will have begun to cut, and are no longer of any use, whether union has taken place or not.

DELAYED OPERATION.—When primary operation has been omitted or has failed, a plastic one is necessary for restoration of the perineal body. These operations should not be undertaken until from six to twelve months after the original injury. During this interval the general health of the patient should be looked after, and tonics administered if necessary. For a week before the operation the bowels should be kept open by mild cathartics, so that all scybala may be removed. In cases of complete rupture the bowels should receive like attention for two weeks, a compound cathartic or compound rhubarb pill, or a saline laxative being given every twelve hours to secure free atonic evacuation; hypercatharsis should be avoided. During the same time the vagina should be thoroughly syringed, night and morning, with warm borosalicylic or hydronaphthol douches. Immediately before the beginning of the operation the parts should be shaved and well scrubbed.

The instruments required will consist of a sharp bistoury, long-handled scissors curved on the flat, two pairs of mouse-toothed forceps and pair of dissecting forceps, a dozen hæmostatic forceps, a needle-forceps, two or more large curved needles, preferably Hagedorn's, as many small curved needles, and a pair of suitable retractors for holding back the labia.

Sterilized silk is to be preferred for sutures, a coarse thread for the deep sutures, and a finer one for the superficial ones. Catgut is best for ligatures, and in some cases for sutures. The patient, dressed for bed, should be placed upon a table, under a good light, in the position for lithotomy, with the pelvis elevated on a hard pillow, and etherized. Four assistants will be found useful, although three may be sufficient. One of these should administer the anæsthetic, one should hold each knee, and the fourth should hand the instruments.

The operative procedures will vary according to the preference of the operator and according as the laceration is partial or complete. The concealed variety should be transformed into the incomplete or partial by transfixion with the bistoury and incision as the initial step of the operation.

FLAP-SPLITTING OPERATION.—This operation was introduced by Lawson Tait and indorsed by Saenger, Martin, Mundé, and others. In this operation no tissue is removed, the result being achieved by simply splitting transversely and perpendicularly the surfaces which are later united. This operation is useful alike in partial and in complete rupture.

The patient, after the usual preliminary preparation, being placed in the lithotomy position, the recto-vaginal septum is split from side to side, beginning in the middle line, by means of a pair of sharp-pointed scissors. If the laceration be an incomplete one, the incision is prolonged up on either side to the upper border of the perineal cicatrix, the depth of the wound upward being not more than from a quarter to a half inch. The upper, or vaginal, flap is then drawn upward by means of a tenaculum or forceps; the lower, or rectal, flap downward in the same manner; and the sutures are

then passed, being carefully concealed throughout, from the left side of the patient to the right, beginning at the point nearest to the anus, using a straight or very slightly curved needle. Thomas and Mundé advise that the sutures be introduced just outside the edge of the wound, emerging at the same spot on the opposite side. Tait recommends passing them just within the edge of the wound, which does not allow the edges of the skin to be brought into close apposition as by the method of Thomas and Mundé. After all the sutures have been introduced, they are tied, and the puckering of the posterior vaginal commissure is corrected by short interrupted catgut sutures, so as to insure complete closure of the wound.

In complete laceration, on either side of the transverse incision which splits the recto-vaginal septum a downward and backward incision is carried, which goes just beyond the edges of the separated sphincter-ani muscles. A more marked dimpling on each side of the anus shows plainly the location of the retracted ends of the sphincter ani when the laceration is complete. The points must be denuded and the sutures so placed as to bring and hold them in apposition until union has occurred. The flaps are held apart, upward and downward as already described, and the first suture, beginning from behind, is inserted just outside and below the edges of the torn sphincter ani and brought out exactly at the same spot on the opposite side. The stitches are then introduced and tied as in the incomplete operation. Although the operation may be performed within ten minutes, it will be found necessary to introduce a certain number of superficial catgut sutures into the perineum or along the vagino-perineal commissure, if we wish to secure perfect cutaneous union. In

complete lacerations there is more certainty of securing a perfect restoration of function of the sphincter-ani muscle, and in preventing the formation of a recto-vaginal fistula than with other methods.

In the after-treatment especial care should be taken to protect the wound from contamination by the urine. The urine should be drawn by a catheter or the patient may be allowed to turn over upon her face and urinate in that position, after which the parts should be thoroughly douched with a boro-salicylic solution. The sutures may be removed after ten days, but such removal should be delayed if they are not causing irritation or have not ceased to hold the parts. The recumbent posture should be maintained for three weeks, and four weeks should elapse before the patient is allowed upon her feet.

EMMET'S OPERATION.—In this operation the crest of the rectocele is first determined as well as the extent of the lateral tears. The posterior surface of the vagina is then "denuded from the edge of the sphincter-ani muscle up each labium to the remains of the carunculæ, and across on the posterior wall of the vagina to the extent of the rectocele," so that the denuded surface, by its median portion and lateral prolongations into the sulci corresponding to the tears, resembles a trefoil. The first suture is introduced near the anus, followed by others introduced at higher levels, the first four being usually carefully concealed in the tissues. The fifth suture perforates only the labium on each side and loops up a part of the median raw surface as it passes over it. The last suture perforates the labium on each side and loops up a portion of the mucous membrane just above the denuded surface.

GALABUS OPERATION.—In this operation the extent of surface to be denuded

is generally that of the cicatrix resulting from the laceration, but "it is well to go a little beyond the limits of this in all directions, especially up the median line of the vagina and toward the lower halves of the labia majora, both in order to secure, if possible, a perineal body somewhat larger and deeper than the original one, and to allow some margin in case the surfaces do not unite completely up to the edges." The mucous membrane of the vagina is first slit vertically in the middle line from a little beyond the upper edges of the cicatrix down to the edge of the sphincter. From the anal end of this median incision semicircular incisions are made outwardly on each side not extending farther than the lower extremity of the nymphae. This blocks out two triangular flaps on each side, which are to be dissected from the anal apex toward the base, which is transverse. All of these flaps when once mapped out are to be removed, excepting a transverse border at the base. They are then united by suture (silk-worm gut). In bringing out the sutures in the centre, Galabin advises that they be brought out "for spaces alternately short and long," so that the surfaces may be more easily brought into contact at all levels without undue tension.

Literature of '97-'98-'99.

The performance of secondary operations for ruptured perineum is advised during the puerperal period; that is, from the second to the twentieth day after labor. The operation is undertaken in those cases where immediate suturing after labor has not been done, or where, if done, has not been successful. The patient's vagina is carefully washed out with corrosive-sublimate solution and a tampon of sublimate gauze inserted to take up the discharge. The tampon is removed just before the operation, the vagina again syringed out, and a fresh tampon inserted, which remains *in situ*

for twenty-four hours. After this the tampon is unnecessary, and careful vaginal douching is sufficient. The operation consists in first marking out the extent of the raw surface, and then removing the granulation or cicatricial tissue with a sharp spoon within that limit. The sutures are then inserted in the usual way, and the raw surfaces brought together. The sutures are removed on the seventh day. Kholmogoroff (Vratch, No. 19, '98).

In complete tear of the perineum the following plan is personally used: The denudation is made so that there is no rectal wound. An incision is carried across the septum at least a centimetre above the margin between the junction of the rectal and vaginal mucous membranes. This incision extends across the whole septum and above and beyond the sphincter-ends. Taking this as the baseline, the operation on the vulvar and vaginal portion of the rent is then made in the usual manner, as in the case of repair of an ordinary relaxed vaginal outlet. Having completed this denudation, the operator turns his attention to the rectal tear. He inserts his left index finger into the bowel and draws the septum forward, and then carefully dissects the strip of undenuded tissue described above so as to free it and turn it down as an apron. At the sides of this flap the ends of the sphincter-muscle are caught up and liberated. The purpose of the flap is to turn down an apron or fold of tissue, which, when the sutures are all in place, projects out of the anal orifice and points in a direction away from the impact of the faecal masses.

When the denudation is complete and the apron turned down, the presence of dead spaces in the septum is avoided by the following plan: Three or four catgut sutures are applied in the form of a figure-of-eight. They are inserted above, and each suture grasps the fibres of the internal sphincter-muscle well to one side of the median-line sutures, is then carried to the opposite side, and then past the tissue of the septum well above the internal sphincter; it then returns to the first side and includes the corresponding area of tissue, and is finally brought out

through the internal sphincter at a point corresponding with point of entrance. This entire suture is buried in the septum. Then the sutures (silk-worm gut) which approximate the triangles are introduced, and then those of the perineal surface. The final step is the union of the edges of the apron, which now lie more or less crumpled together and projecting at the anus; by leaving these sutures long and making slight traction this entire line can be drawn well outside and fixed on the buttocks by a strap of adhesive plaster. Howard Kelly (Amer. Jour. of Obstet., Aug., '99).

The reason a dead space is often left in closure of lacerated sphincter is that the operator does not denude far enough beyond the fistula. As the surfaces to be sutured represent two arcs of a circle, it is necessary to suture so that they radiate like the sticks of a fan. No matter how the sutures are inserted, if the bowels are not moved daily by a saline cathartic, a certain percentage will necessarily fail. T. A. Emmet (Amer. Jour. of Obstet., Aug., '99).

VALERIAN.—Valerian is the rhizome and rootlet of *Valeriana officinalis* (nat. ord., *Valerianaceæ*): a native of Europe, but cultivated in America. The principal constituent of valerian is a volatile oil which, by oxidation, yields valerianic acid. Valerianic acid may be made artificially by the oxidation of amylic alcohol, and it is from this acid that the official valerianates of ammonia, iron, quinine, and zinc are found; but it does not quite correspond with the natural acid in its physiological effects. The ammoniated tincture is a valuable preparation, owing to the stimulating and carminative effects of the ammonia. The valerianates are seldom used except in the combination known as the "three valerianates" of iron, quinine, and zinc. An elixir of valerianate of ammonia is an excellent preparation when well made; it should contain 2 grains of the salt to

the fluidrachm and may be given in quantities up to a tablespoonful.

Preparations and Doses.—Valeriana (U. S. P.), 10 to 30 grains.

Extractum valerianæ fluidum (U. S. P.), 4 to 8 drachms.

Tinctura valerianæ, U. S. P. (20 per cent.), 1 to 2 drachms.

Tinctura valerianæ ammoniata, U. S. P. (powdered root, 20 parts; aromatic spirit of ammonia, sufficient to make 100 parts), 1 to 2 drachms.

Physiological Action.—Valerian is a very feeble depressant to the nervous system, tending to produce rest. It reduces irritability and reflex contractions, and is a sedative to the spinal cord. In large doses it produces a feeling of warmth in the stomach, and sometimes nausea, vomiting, and colicky pains. The pulse is generally slightly quickened, and a sense of exhilaration is induced, accompanied, however, by fornication in the hands and feet (H. C. Wood). Very large doses cause a feeling of heaviness, and even of pain, in the head.

Therapeutics.—Valerian is valuable for the relief of the milder forms of functional disturbance arising from a weak and overexcitable or an exhausted nervous system. It is, therefore, given with advantage in nervousness and hysteria, but is less useful in *mania a potu* and in the delirium of adynamic fevers, in which latter cases it is generally conjoined with the bromides or with more powerful remedies.

VALVULAR DISEASES OF THE HEART AND ENDOCARDITIS.

Endocarditis.

Definition.—Inflammation of the membrane lining the cavities of the heart. The process may be acute or chronic. The acute form is variously described as

"simple," "benign," or "verrucose," and "ulcerative," "septic," or "malignant," according to the mildness or severity of the disease; but between these two forms there is in reality no dividing-line. The disease attacks mainly the valves of the heart.

Acute Endocarditis.

Symptoms.—The onset of acute endocarditis is insidious. There may be no symptoms which call especial attention to the organ affected. There may be a slight rise of temperature, and some quickening, and possibly some irregularity, of the pulse. In the benign form there may be no evidence of the disease until two or three months after it has run its course, when impairment of the valves is detected. In some cases there is præcordial pain, or, if the patient is a child, there may be epigastric distress, with vomiting. The pulse is of low tension, and the patient may be restless and anxious, and may prefer a somewhat recumbent to a horizontal position. Examination of the heart will disclose in most cases a murmur, usually of a blowing character, and usually systolic in time. It may accompany or replace the normal sound. Even in the malignant form the symptoms may be masked by those of the original disease. In the severer cases sometimes there is a true chill or a succession of chills; and the fever may be either typhoidal or intermittent or remittent in its character. The patient gives evidence of great prostration. The pulse is rapid and irregular; the body bathed in profuse perspiration; the spleen enlarged and tender. There may be a rose-colored eruption upon the body; more often petechiæ are seen. The number of white corpuscles in the blood is greatly increased.

In some cases, even the worst, careful and repeated examination by competent

observers may detect no cardiac murmur whatever.

The simple form may give rise to embolism in different parts of the body, and may also be complicated by pleurisy or pneumonia. The malignant form is still more apt to give rise to emboli than is the simple form, and also frequently distributes infection. In fact, scarcely any tissue is exempt from these dangers. Thus, there may be embolism of the femoral or external iliac arteries, or of the capillaries of the skin. There may be infarctions in the spleen, causing a swelling and tenderness of that organ; in the kidneys, giving rise to renal hæmorrhage; in the brain, with resulting paralysis or softening; in the intestines, with bloody stools. The retina, conjunctiva, gums, parotid gland, and stomach may be affected. In some cases there is acute jaundice, with symptoms simulating acute yellow atrophy of the liver; and, as just stated, these lesions are not merely mechanical, but infectious, and apt to give rise to suppuration.

When acute endocarditis is due to recurrence of inflammation in a valve previously fibrotic, abscesses are unusual.

The duration of the disease in the milder cases is usually from two to six weeks, perhaps in most instances about four weeks. The malignant cases may reach a fatal termination in one or two days; or again, they may be prolonged for several months, or a year, and then prove fatal. Some cases of simple endocarditis are not suspected during their course nor betrayed by sequelæ; thus, minute vegetations may be found, post-mortem, upon the valves of patients who die of consumption or of carcinoma, which have been of no importance whatever. The great harm that simple endocarditis does the patient is not immediate, but consists in laying a foundation

for ultimate changes in the valves, which impair the functional integrity of the heart.

Diagnosis.—The first question to settle with regard to diagnosis is whether any endocarditis exists at all, and, secondly, whether the form is simple or malignant. There may be no objective cardiac signs distinctive of the disease. Usually, however, there is a systolic apical murmur, and the heart is enlarged, with a more widely diffused impulse than normal, and an excited—though feeble—action.

It should be borne in mind that many of the diseases with which acute endocarditis is etiologically associated give rise to functional cardiac murmurs; so that the mere discovery of an abnormal sound over the heart does not establish the diagnosis.

TYPHOID FEVER is more gradual in its onset and has a small number of white blood-corpuscles contrasted with the leucocytosis of endocarditis and an infrequent pulse. Moreover, the Widal reaction is distinctive of typhoid, as would also be the discovery of typhoid bacilli in the stools. Typhoid may give rise to infarctions, and to inflammation of the parotid, but not often.

ACUTE TUBERCULOSIS has its hectic fever, rapid wasting, possible pulmonary signs, sometimes tubercle bacilli, and, as a rule, no objective cardiac symptoms.

MALARIAL FEVER may be recognized by the discovery of the characteristic organisms in the blood.

SEPTICÆMIA AND PYÆMIA have symptoms identical with those seen in certain forms of malignant endocarditis, which disease has, indeed, been called an arterial pyæmia. In some acute cases there is possibility of confusion with typhus fever, cerebro-spinal meningitis, abscess of the liver, and hæmorrhagic small-pox.

IN SEVERE INFECTIOUS DISEASES, UN-

less there be signs of obstruction of a valve, it may be impossible to determine whether there be endocarditis or a myocarditis due to toxins, rendering the wall flabby and the mitral valve relatively incompetent.

Etiology.—Endocarditis is an infectious disease, and almost always secondary to some other. It is most frequently an expression of rheumatism. It may follow tonsillitis, pleurisy, chorea, measles, small-pox, and any acute infectious disease, particularly scarlet fever. Pneumonia, influenza, erysipelas, gonorrhœa, pericarditis and meningitis may present this complication; as may also, in rare instances, typhoid fever, tuberculosis, and diphtheria. Osteomyelitis, puerperal fever (as well as other vaginal or uterine affections), empyema, bronchiectasis, external wounds, and any form of septicæmia may occasion endocarditis. Cancer, gout, diabetes, and Bright's disease may give rise to it.

Almost invariably some form of bacteria is found in the lesions; but there does not seem to be any bacterium peculiar to the disease. In both the simple and malignant forms the pyogenic microorganisms are those most often encountered; namely, streptococci, staphylococci, pneumococci, and gonococci.

Before birth the right side of the heart is almost exclusively affected; after birth, the left. Early adult life furnishes a majority of the cases; and, according to the latest statistics, men are somewhat more liable to the disease than women.

Literature of '97-'98-'99.

Eighty-four cases of infective endocarditis were met with at St. Bartholomew's Hospital, from January, 1890, to March, 1897. Fifty-one were males and thirty-three females; the average ages of males, 62.7 per cent. between 20 and 40 years; females, 51.5 per cent. between

10 and 30 years, and 33.3 per cent. between 15 and 25 years. In all but 10 cases either old cardiac disease or an inflammatory infective lesion accompanied the endocarditis. Of these 10, malignant disease occurred in 4; a possible pneumonia in 1; so that only 5 could be considered as uncomplicated, or as a primary infective endocarditis, not preceded by either cardiac lesions or infective lesions in other parts of the body. There was pre-existing cardiac disease in 64.27 per cent.; 29.8 per cent. were accompanied by recognized infective processes (not counting acute rheumatism or chorea as such). Bronchiectasis, empyema, vaginal or uterine affections, and also influenza must be regarded as pyrogenic sources of infection. An antecedent pneumonia occurred in 14.23 per cent. of all the cases. When an endocarditis appears in the course of an infective fever there may be homologous, heterologous, or mixed infection of the endocardium. The infective endocarditis in some cases may be merely a "terminal infection," the micro-organisms invading the tissue just before death, without being actually responsible for the lethal ending. Kanthack and Tickell (*Edinburgh Med. Jour.*, July, '97).

Pneumonic endocarditis is not very infrequent. A malignant endocarditis arising in connection with pneumonia may be caused by (1) the pneumococcus and (2) the streptococcus and staphylococcus. These different forms of the disease are differentiated by the course, temperature-curve, and complications. The course of a true pneumonic endocarditis is much shorter than that of a streptococcic endocarditis. When malignant endocarditis is due to the pneumococcus, the fever is usually continuous, whereas in the other forms it is intermittent. Infarcts and metastatic abscesses are very rare in pneumonic endocarditis, but are usually found in the endocarditis produced by the pyogenic microbes. Kerschensteiner (*Münch. med. Woch.*, Aug. 3, '97).

Of 9 cases of ulcerative endocarditis, 6 were men and 3 were women, ranging in age from 19 to 50; all died. In some instances the disease began with rheumatic pains and joint-involvement. In

2 cases direct injury, in one a septic wound of the forearm, and in another a crush of the arm, seemed to be the cause. In one instance the disease was associated with malaria, the plasmodium being found in the blood. Ludwig Herzog (*Deut. med. Woch.*, Nov. 10, '98).

Thirty-six cases of endocarditis were studied from the bacteriological point of view by microscopical and culture-methods. In thirty-four cases the result was positive, in two only it was negative. The histological examination in both these cases established the fact that they were not a true endocarditis, but an atrophic thrombosis. From an analysis of the cases it is concluded that (1) the diplococcus and the streptococcus are the most constant agents in endocarditis; (2) that these are able to produce, whether alone or associated with other micro-organisms, the ulcerated as well as the verrucose form; (3) that the diplococcus more frequently causes aortic, and the streptococcus mitral, endocarditis. Desse (*Lo Sperim.*, anno lii, fasc. 1, '98).

For many years it was held that ulcerative endocarditis complicating gonorrhoea was due to a mixed infection with some other organism than the gonococcus. Since 1894, however, many competent observers have reported cases in which only the gonococcus was found in the blood and on the cardiac vegetations. Councilman, Gluzinsky, and Leyden have reported such cases. One of the most valuable cases was that reported by Thayer and Blumer. Not only was the gonococcus found on the heart-valves, but it was grown in pure culture from the blood during life, showing that the gonococcus may pass by means of the blood-current to distant parts of the body, and there give rise to infections. Berg (*Med. Record*, Apr. 29, '99).

Pathology.—It has already been said that clinically there is no dividing-line between the simple and malignant forms of endocarditis. This is also true pathologically. The simplest lesions consist in minute warty vegetations, varying from one to four millimetres in diameter, seated upon the valves. These consist of

masses of fibrin, leucocytes, blood-platelets, and micro-organisms. Sometimes the vegetations are so large as to obstruct the valvular orifice. Even in the simple form (endocarditis verrucosa) there is more or less ulceration of the valvular endocardium. In the malignant form (endocarditis ulcerosa vel diphtheritica) necrosis is more extensive. The valve may be so thinned as to give way under the pressure of the blood, thus producing a valvular aneurism, or actual perforation of the valve. A portion of the valve may be destroyed and broken off, or some of the chordæ tendineæ may be ruptured.

The vegetations are situated mainly on that surface of the valve which is opposed to the blood-current. Thus, the lower surface of the aortic valves and the upper surface of the mitral valves are chiefly affected.

Exceptionally the heart-wall suffers, sometimes leading to cardiac aneurism or perforation of the ventricular septum or perforation into the pericardium.

The associated lesions peculiar to endocarditis are mainly caused by emboli; and yet it is a surprising fact that sometimes, even when the valvular lesions are decidedly ulcerative, no evidence of embolism may be found post-mortem.

Embolism affects the spleen and kidneys most frequently, and also many other organs, as above enumerated. If the right side of the heart is affected, there may be multiple pulmonary abscesses.

Prognosis.—First, it is possible that very slightly developed cases of simple acute endocarditis recover without any real damage. The great danger from the non-ulcerative form, besides embolism, is the setting up of a chronic fibroid deterioration of the valve, ultimately destroying its efficiency.

The malignant forms are almost invariably fatal. Cases in which the acute process has been kindled upon the remains of a former valvular inflammation are somewhat more hopeful.

Treatment.—First, prophylaxis: Rheumatic patients should be kept as quiet as possible. The salicylates do not seem to lessen the liability of such patients to endocarditis. It may be that the administration of alkalis in sufficient amounts to keep the urine neutral is of some advantage.

During the last thirteen years rather more than 300 cases of acute rheumatism have passed under personal care, 52 of which developed endocarditis. In all the cases perfect rest, avoidance of exertion, and a light milk diet were adopted. In 13 cases treatment was directed to the rheumatism only, no special remedies being employed for the cardiac complication; in 1 case the bruit disappeared spontaneously; in the others the lesion was permanent. The remaining cases were treated on a definite plan. As soon as the first indications of a bruit made their appearance, sodium or potassium iodide in 10-grain doses was given thrice daily in addition to the salicylates, and a blister an inch in diameter was applied over the apex. As soon as the irritation of this blister began to subside a second was applied close to it; then a third, and so on, the patient being kept meantime as quiet as possible, exertion, exposure, and excess of nitrogenous food being strictly forbidden. A gradual subsidence of the bruit was frequently noticed in ten days. Of these 39 cases 29 were discharged with normal heart-sounds, 10 with a bruit. Richard Caton (Liverpool *Medico-Chir. Jour.*; *Med. Record*, Apr. 4, '96).

In the various children's diseases the only way in which we can protect the patients from cardiac complications is by insuring bodily quiet and good ventilation and avoiding exposure to cold.

In gonorrhœa such internal antiseptics as salol and urotropin are advisable.

Antistreptococcic serum may be injected in any case where we dread that pyogenic organisms may be attacking the heart.

Second, when the disease has actually developed, an ice-bag wrapped in flannel may be kept over the heart if not disagreeable or depressing to the patient. Or, instead of this, a thin layer of cotton-wool may be applied. Violent counter-irritants are not indicated. If the heart's action is excited, aconite or bromide of sodium may be administered. Still more efficient, and in case of cardiac distress indispensable, is morphine, used in carefully-regulated amounts. Most important of all is absolute bodily quiet, and this should be maintained for at least four to six weeks. In case the heart begins to fail, recourse must be had to digitalis, strophanthus, alcohol, ammonia, and other cardiac stimulants, but in many cases their use will prove unavailing. Sometimes when the attack has been long continued, arsenic has been found beneficial.

In repeated instances antistreptococcic serum has proved efficacious, even when the disease has been well developed.

An ice-bag over the heart calms the patient and relieves the dyspnoea and oppression. If the pain is very great, injections of morphine may be given. Cold baths are useful. The diet should consist entirely of milk, and the patient should receive small quantities of alcohol and quinine or salicylic acid. The alcohol should be given in the form of Bordeaux wine or champagne, and coffee may be used as a stimulant. Alcohol is particularly hurtful in cases in which there is cardiac distress. The inhalation of oxygen in considerable quantities, at least one hundred quarts a day, gives good results. Quinine is given in the dose of from 8 to 15 grains a day. Should the heart become feeble, it may be well to give small doses of the tincture of digitalis. Plicque (*Revue Internat. de Méd. et de Chir.*, Apr. 10, '96).

Literature of '97-'98-'99.

In the treatment of septic endocarditis the strength of the patient must be increased by all means possible. Milk, eggs, port-wine, brandy, and strong coffee should be given.

A water-bed is beneficial. The affected joints should be protected, kept at rest, and an ice-bag placed upon them; internally, sodium salicylate in solution should be administered. An ice-bag should be kept constantly upon the heart; in case of high fever, another upon the head. If a febrifuge is required, 7 grains of quinine in powder or wafers are recommended. If severe diarrhoea supervenes, 15 grains of bismuth subnitrate, or tannic acid, 3 grains, with $\frac{2}{10}$ grain of opium, may be given every hour or two. Ludwig Herzog (*Deut. med. Woch.*, No. 45, '98).

Chronic Endocarditis.

Chronic endocarditis may develop in a previously healthy valve. It is more often a sequel to acute endocarditis. The symptoms are those of valvular disease of the heart, and will be discussed later.

Its etiology is, first, hereditary tendency to arterial sclerosis. Secondly, certain predisposing causes, namely: gout, alcohol, syphilis, and habitual muscular overexertion. Exceptionally the wall of the heart itself is affected by the process, in which case it presents scar-like patches, which are often associated with myocarditis.

Valves changed by chronic endocarditis are more or less opaque, thickened, and cicatricial or calcified. They may be contracted, deformed, curled up, and adherent by their edges to one another. The chordæ tendinæ may be involved in the process and thereby deformed, or fastened one to another, or greatly contracted so that the distorted valve is apposed to the muscular papillæ. The apices of the papillæ themselves may be more or less fibrotic. Fœtal endocarditis is usually of this chronic form.

Valvular Lesions.

Whether the abnormal state of the affected valve causes incompetence or obstruction, there results in either case an unnatural demand upon the muscular power of the heart. Thus, stenosis leads to an increased effort during systole of that cavity which is obliged to force blood through the narrow outlet, and a leaking valve permits blood to flow backward into the cavity which it has just left, and thus obliges it to do part of its work a second time. In either case, the affected cavity is made to contain a larger amount of blood than normal.

In case either auriculo-ventricular valve leaks, the corresponding ventricle receives, during diastole, a larger amount of blood than normal from the overdistended auricle.

The heart possesses reserve forces, and, while the immediate effect of a valvular lesion is dilatation of the chamber affected, the secondary result is hypertrophy of the muscular walls, and a more or less complete fulfillment of the new demands. Unfortunately, however, there is for several reasons a tendency to retrogression. In the first place, the valvular endocarditis may grow worse by slow change or because of a recurrent acute inflammation. Secondly, the myocardium is apt to deteriorate so that the muscular power of the heart diminishes. Thirdly, in some forms of valvular disease, particularly aortic, the coronary arteries from which the heart derives its nourishment are apt to be involved. The period during which the heart, having hypertrophied, remains equal to the demands made upon it is called the period of "compensation." Sudden exertion, great mental excitement, or the stress of intercurrent disease may cause a temporary "disturbance" of this compensation. Finally, extreme degrees of val-

vular deformity and myocardial degeneration bring about "ruptured compensation," from which there is little hope of recovery.

Mitral Regurgitation.

Definition.—Insufficiency of the mitral valves, permitting blood to leak into the left auricle during systole.

Symptoms.—The subjective symptoms of mitral regurgitation depend upon the degree of compensation present in the individual case. Thus, if the condition is a favorable one, the patient may be unconscious of any unnatural state whatever, having no dyspnoea except on considerable physical exertion. On the other hand, if the circulation is beginning to be embarrassed, we may observe palpitation, shortness of breath on exertion or excitement, cyanosis, œdema of the dependent parts, and so on, as described in a previous volume under DILATATION OF THE HEART. On physical examination the heart is found to be enlarged mainly in its transverse diameter, the apex being pushed toward the left, and the limit of dullness extending further toward the right than in health. The cardiac impulse may be more diffuse than in health, and visible in the epigastrium as well as in the normal position. In young subjects the præcordia may be somewhat bulged. On palpation, a systolic thrill may sometimes be distinguished; this is not, by any means, the rule, however. On auscultation, we hear at the apex of the heart a murmur systolic in time and transmitted outward toward the axilla. This murmur is also audible inside the lower angle of the scapula. At the base the pulmonic second sound is accented and often reduplicated. The pulse in well-compensated cases may be nearly normal. In later stages it is rather small, frequent, of low tension, and irregular in force and rhythm.

Diagnosis.—The important factors in diagnosis are, first, the systolic murmur, which is usually heard loudest at the apex and transmitted outward, and which, in some instances, may be heard over a much more extensive area; in fact, almost all over the chest. Again, the murmur may be audible merely along the left edge of the sternum. The sound is of a blowing character, sometimes musical, especially toward its termination, and it replaces the first sound of the heart to a greater or less extent.

The second factor in diagnosis is the transverse enlargement of the heart. The apex may be lowered into the sixth space, but the main change is in the width of the cardiac dullness, which may extend from the left anterior axillary line to the right nipple.

Thirdly, the pulmonic second sound, heard in the second left space or over the third left costal cartilage, is accented and perhaps reduplicated. Relative insufficiency of the mitral valve, with a normal condition of the valves, but with such dilatation of the left ventricle as to prevent the closure of the mitral orifice, may give rise to a precisely similar trio of signs.

It has been claimed that the only means of making the diagnosis of valvular incompetency as distinguished from relative insufficiency would be to find, in addition to the other signs, a pre-systolic murmur due to accompanying stenosis of the diseased valve. In many cases the history of the disease and the general appearance of the patient would be equally decisive. Functional or hæmic murmurs may be heard during systole at the apex and transmitted outward, but they are not associated with enlargement of the heart or accentuation of the pulmonic second sound.

Etiology.—Deformities of the mitral

valve leading to incompetency are caused by acute endocarditis, and still more frequently by chronic fibroid change. Relative incompetency of the mitral valves may be due to failing compensation in case of an aortic lesion; or to the terminal stage of idiopathic hypertrophy of the heart (meaning that condition of the myocardium which is seen after habitual excess in muscular exertion and in the use of alcohol); also to changes in the heart secondary to chronic nephritis, arteriosclerosis, and chronic adhesive pericarditis.

Literature of '97-'98-'99.

Among 5827 patients under personal observation and treatment at the general medical clinic of the New York Post-graduate Medical School, 503 were found to be suffering from some form of disease of the heart or great thoracic vessels. These cases may be divided into two chief classes as follows: Functional disorders, 277 cases; organic diseases, 226 cases. The organic cases were mitral regurgitation, 60 cases; mitral stenosis, 35 cases; aortic regurgitation, 7 cases; aortic stenosis, 36 cases; tricuspid regurgitation, 6 cases; pulmonary stenosis, 1 case; double aortic lesions, 19 cases; double mitral lesions, 12 cases; aortic stenosis and mitral regurgitation, 4 cases; aortic regurgitation and mitral stenosis, 2 cases; aortic regurgitation and mitral regurgitation, 2 cases; double aortic lesions and mitral stenosis, 1 case; double aortic lesions and mitral regurgitation, 4 cases; combined double aortic and double mitral lesions, 2 cases; mitral lesions of doubtful character, 4 cases; aortic lesions of doubtful character, 3 cases; simple cardiac hypertrophy without apparent valvular lesion, 10 cases; angina pectoris without valvular lesion, 3 cases; myocarditis, fatty degeneration, etc., 6 cases; thoracic aneurism, 6 cases.

Of the total number of persons under observation, 3344 were males and 2483 were females. Among the 3344 males, 149—or about 4.45 per cent. of the number—suffered from functional troubles, while 137, or 4.09 per cent., had organic

heart disease. Of the 2483 females, 128, or 5.15 per cent., had functional disease, and 86, or about 3.46 per cent., had organic lesions. Among males one of three great causes could usually be assigned for functional disorders. In the order of frequency these were: (1) reflex disturbances due, as a rule, to digestive disorders; (2) the use of tobacco in excess, especially among adolescent youths; and (3) too liberal indulgence in alcoholic liquors. Among the females the causes operating to produce functional disorders of the heart were mainly those referable to digestive disturbances and to diseases of the blood: *anæmia*, *chlorosis*, etc. Only a minute proportion could be justly attributed to excessive tea-drinking. The hæmic murmurs are almost invariably systolic in time, occurring either over the aortic or pulmonary areas, or in both regions; are usually transmitted into the great arteries of the neck, where they may be classed as vascular bruits, and are, in a majority of cases, accompanied by a venous hum. The blood-murmurs are rarely audible below the third rib, and in more than a hundred consecutive cases the maximum intensity of these bruits was found over the mitral area in only two.

While mitral regurgitation is the most frequent, it is also the most hopeful of all the valvular lesions, and is also the most tractable when complications begin to appear. James K. Crook (*N. Y. Med. Jour.*, June 19, '97).

Pathology.—The diseased valve presents the changes already described under the head of *CHRONIC ENDOCARDITIS*. The edges of the valve-segments and of the chordæ tendineæ to which they are attached are frequently more or less adherent one to another. In advanced stages the valvular orifice may be transformed into a rigid, calcified ring. The mechanical effects of mitral regurgitation are as follow:—

During systole blood escapes backward through the valve into the left auricle, which cavity, therefore, receives blood

both from normal sources and from this new abnormal one. Consequently the left auricle becomes dilated, and, as a consequence of the new demands made upon it, hypertrophied, so that its walls may be three or four times the normal thickness. Moreover, the left ventricle receives with each diastole, not only its normal quantity of blood, but an abnormally great amount from the dilated and hypertrophied left auricle; so that it also becomes dilated and hypertrophied. As the valve-lesions become aggravated, or the strength of the left auricle diminishes, the flow of blood from the pulmonary veins into the left auricle becomes impeded and the whole pulmonary circuit congested, thus putting a strain upon the right ventricle. It is the hypertrophied right ventricle which is the main factor in preserving a normal flow of blood in case of mitral regurgitation. At last the right ventricle fails,—dilates; the tricuspid valve becomes relatively incompetent; the right auricle is embarrassed, and finally the systemic circulation becomes congested.

Patients with mitral regurgitation before the advent of the subjective symptoms may be seen to be slightly cyanotic, and young subjects are apt to have clubbing of the ends of the fingers. As compensation fails, the lungs become congested and cedematous and undergo brown atrophy; the liver, spleen, and kidneys present the lesions of passive congestion, the lower extremities begin to be cedematous, and finally generally dropsy and orthopnoea appear.

Prognosis.—Mitral regurgitation may exist for years without subjective discomfort, particularly if the patient escapes any great nervous or physical stress in life. Moreover, when compensation is impaired, judicious treatment will repeatedly restore the patient to a state of

comfort. Finally, of course, the embarrassment cannot be alleviated and death ensues; but death is apt to be gradual rather than sudden.

Treatment.—With regard to treatment, much which is applicable to this subject has already been detailed in the article upon DILATATION OF THE HEART, and other considerations will be discussed at the end of the section on VALVULAR DISEASES.

Mitral Stenosis.

Mitral stenosis is a change in the mitral valves which impedes the normal flow of blood from the left auricle into the left ventricle.

Symptoms.—Many individuals present this lesion without being conscious of ill health. They may experience a certain amount of shortness of breath upon exertion, but do not suspect the existence of cardiac mischief. Some patients are of a tolerably fresh complexion and do not suggest the idea of cardiac difficulty, but rather of chlorosis; such patients, so far as the writer's experience goes, are rather slight and undersized. The great majority of sufferers are women. Some cases are supposed to be congenital, but this must be exceptional. As compensation fails, we have the usual train of cardiac symptoms, with the difference that pulmonary engorgement, bronchitis, passive congestion of the lungs, orthopnoea and hæmoptysis are more common with this than with other valvular lesions because of the direct way in which it impedes the pulmonary circuit.

Diagnosis.—As already stated, the disease may be unsuspected until a physical examination is made. Upon inspection of the chest, we may observe the apex-beat, displaced slightly to the left. The lower part of the sternum and the apex region may be somewhat prominent in children, and an impulse may be

seen with the systole in the fourth and fifth left space, due to the hypertrophied right ventricle.

Upon palpation near the apex, usually somewhat inside of it, may be felt a remarkable purring thrill, which will be found to be presystolic in time and to terminate with a distinct shock corresponding to the beginning of cardiac systole. This shock may be felt over three or four intercostal spaces to the left of the sternum. Its origin is a matter of considerable speculation, but not as yet of demonstration.

On percussion the cardiac area will be found to be increased transversely to the right of the sternum. On the left it often reaches somewhat higher than normal, but laterally not much beyond the normal limits.

On auscultation at or inside the apex is heard a presystolic murmur of a characteristic quality. It is more or less rubbing, rumbling, or churning, and terminates with a sharp valvular sound corresponding to the shock felt by the hand. Immediately following this sound, if the case is one of pure mitral obstruction, is a brief pause, and then a fainter valvular sound is heard corresponding to the second sound of the heart.

If the case is one of stenosis and regurgitation combined, the first sharp valvular sound is followed by a systolic murmur.

The character of the typical presystolic murmur of mitral stenosis is so distinctive that it would seem to the writer possible to establish a diagnosis of mitral stenosis upon this sound alone without other evidence.

At the base of the heart in the second left space is heard a sharply-accented and usually reduplicated sound, corresponding to the closure of the pulmonary valves under tension.

In cases of failing compensation, the thrill may be difficult to feel. It may sometimes then be perceived by apposing the palm of the hand lightly to the chest-wall, when a very faint and extremely circumscribed thrill may be detected. With a dilated heart the auscultatory sounds also are indistinct. It may be impossible to recognize the existence of mitral stenosis in a patient seen then for the first time. If, however, compensation be restored wholly or in part, the murmur may reappear. The time of the murmur may be post-diastolic or middiastolic rather than strictly systolic. The pulse is small, regular, and sometimes of rather high tension. When compensation fails, it becomes weak, frequent, irregular, and intermittent.

Tricuspid stenosis may give rise to a presystolic murmur, situated to the right of the sternum; but this disease is extremely rare unless congenital, and when it does occur is apt to be secondary to chronic lesions of the left side of the heart. Persons born with tricuspid stenosis are apt to be simultaneously affected with other abnormalities which entail speedy death.

The late Austin Flint called attention to the presystolic murmur frequently heard in cases of aortic regurgitation at the apex of the heart, and ascribed it to the influence of the blood-current falling into the left ventricle through the incompetent aortic valves. This murmur is associated with the ordinary signs of aortic regurgitation and is not accompanied by the peculiar thrill felt in mitral stenosis; nor is it followed by the systolic shock above described.

Etiology.—Rarely the lesion may be congenital. In most instances it is the result of valvular endocarditis due to rheumatism or chorea or some other of the children's diseases. Anæmia and

chlorosis have also been thought to have some influence in promoting its occurrence.

Pathology.—Mitral stenosis is almost invariably associated with a greater or less degree of mitral regurgitation. By itself, mitral stenosis does not cause much enlargement of the heart. The left ventricle may be of normal size or smaller. The left auricle and right ventricle are, however, much dilated and hypertrophied. The valves may be changed to a variable extent. In the most extreme cases the auriculo-ventricular orifice is scarcely big enough to admit the head of a pin. The left auricle often contains thrombi. Sometimes the great enlargement of the left auricle causes pressure-paralysis of the left recurrent laryngeal nerve—the same lesion which is caused, more often, by thoracic aneurism.

Literature of '97-'98-'99.

Analysis of the cases of mitral stenosis found at autopsy at Guy's Hospital during the ten years, 1886 to 1895, inclusive. There were 4791 necropsies, in 196, or 4 per cent., of which the mitral orifice measured three and a half inches or less. The stenosed orifice exceeded two and a quarter inches (one finger) in circumference in 108 cases, and measured two and a quarter inches or less in 85. Of the 196 cases, 107 were females and 89 males. The average age of death for both males and females was the same—thirty-eight and a third years. In 32 instances tricuspid and mitral stenosis occurred together. Of these 21 were females and 11 males. The tricuspid stenosis accompanied almost exclusively the severe form of mitral disease which was present in 24 of the total 32 cases. In "a large proportion" of all the cases the aortic valves were thickened, distorted, or otherwise defective, but were seldom referred to as stenosed. Excluding the cases for 1886, there were 77 cases of severe and 96 of the slighter form of mitral stenosis for the other nine years. Auricular hypertrophy was recorded as

present in 44 of the 77 cases of severe mitral stenosis, and in 21 of the 96 slighter cases.

The left auricle was stated to have been much dilated in 14 of the 77 cases of severe stenosis, dilated in 18 others, and slightly dilated in 7. Among the 96 less severe cases it was much dilated in 8, dilated in 15, and slightly dilated in 6. Hypertrophy of the right ventricle, of more or less marked grade, was present in 41 of the 77 severe cases, and in 25 of the 96 cases of less marked stenosis. The right ventricle was dilated in 40 of the 77 severe cases and in 27 of the 96 slighter cases. The left ventricle was generally normal or small; rarely enlarged by hypertrophy or dilatation. Pericarditis had been present in nearly one-third of all the cases. The pericardium was universally adherent in 35 instances. Sudden death occurred in at least seven cases. A presystolic murmur is heard sometimes in the course of the disease in about three-fifths of all cases, and a thrill felt in about one-third or less, while a history of rheumatism may be traced in upward of 60 per cent. of all cases. Samways (*Brit. Med. Jour.*, Feb. 5, '98).

Prognosis.—As already stated, mitral stenosis is not incompatible with a tolerable degree of health, and may not for years call attention to itself. Even after compensation has been impaired, great improvement may be repeatedly obtained by suitable treatment. On the whole, the disease may be said to be somewhat less favorable than is mitral insufficiency. Yet, of this, as of every cardiac lesion, it should be said that the prognosis depends upon the peculiarities of the individual case, which should be considered upon its own merits.

Treatment.—For treatment, see the article on DILATATION OF THE HEART and also GENERAL REMARKS at the end of this section.

Aortic Regurgitation.

Definition.—A lesion of the aortic

valves allowing a reflux of blood into the left ventricle during diastole.

A patient with free aortic regurgitation may for years lead an active life unconscious of his condition. In no other valvular disease is compensation, while it lasts, so perfect. If, however, the lesion develops abruptly, it will produce marked symptoms. For instance, when it is consequent upon the sudden rupture of a segment of the valve during violent physical exertion, or when the valve is perforated by the ulcers of malignant endocarditis, the heart may be almost or completely overwhelmed by the sudden strain put upon it, the left ventricle dilating and thus causing relative insufficiency of the mitral valve, engorgement of the lungs, and an embarrassment of the whole circulatory apparatus, from which the patient can scarcely recover.

In some instances the first shock is successfully endured, and a slow development of the reserve-power of the heart establishes compensation. This happier result was observed by the writer in the case of a Western miner in whom the aortic lesion developed over night.

Symptoms.—Where compensation has been perfect and is beginning to fail, the first symptoms may be cerebral, such as dizziness, flashes of light, and slight headache; there may also be faintness and palpitation on slight exertion. A patient seen by the writer had for his first symptom a sharp neuralgic pain in the lower jaw which developed while he was carrying a canoe on his back through the woods of Maine. Pain may be very prominent. It is usually præcordial, but may extend into the neck and down the arms, particularly the left arm. Angina pectoris may occur, and in no form of valvular disease is sudden death more common than in this.

Compared with mitral lesions, there is

less apt to be cyanosis, bronchitis, or anasarca; more apt to be head-symptoms and pallor. Embolism may occur, and slight febrile attacks are not uncommon, either due to recurrent endocarditis or in some instances to articular rheumatism. In this and in other valvular lesions there may be delirium toward the close of life.

It is also stated that there seems to be some connection between mental diseases and cardiac lesions even when well compensated. With regard to this the writer has had no practical experience. It is usually said that the cardiac psychoses are apt to be of a melancholy character. Savage says: "With aortic or with both aortic and mitral disease, the symptoms may be either melancholic or maniacal; but I am inclined to think that, with simple aortic disease and with hypertrophy of the left ventricle, it is at least not uncommon to meet with acute mania and exaltation of ideas."

Aortic regurgitation sometimes occasions cerebral hæmorrhage; and pericarditis sometimes complicates disease of the aortic valves whether stenosis or regurgitation.

Upon physical examination it is usually easy to recognize aortic insufficiency if it exists. Inspection shows an extensive and powerful cardiac impulse. The apex is seen to be in the sixth or seventh intercostal space in the nipple-line or outside, and the chest-wall may be prominent over the hypertrophied left ventricle. Upon palpation, the powerful action of the heart is evident, and exceptionally there may be a diastolic thrill. In this disease the heart may attain its largest dimensions.

Upon auscultation, there is heard a diastolic murmur, which may be loudest in the second intercostal space on the right, or in the third or fourth space at the left edge of the sternum. Exception-

ally it may be heard best at the left side near the xiphoid cartilage. This murmur is of low pitch, and of a blowing character, and it may replace the second sound of the heart. If not, it begins immediately upon the occurrence of that sound. No cardiac murmur is audible over so extensive an area as may be that of aortic regurgitation. It may be heard all over the chest, and in the brachial and femoral arteries. In some cases it is difficult of detection, and, when this or any valvular lesion is suspected, it may be laid down as a general rule that no examination is complete unless auscultation has been carefully practiced when the patient was in a horizontal and also in a vertical position.

Sometimes the murmur can be heard best with the naked ear applied to the uncovered chest-wall. Exceptionally the murmur may be heard only at the apex of the heart, and the murmur described by Flint, presystolic in time and heard at the apex, should be borne in mind. This has been already described in discussing the diagnosis of mitral stenosis. Flint's murmur is of a blubbery character, and heard only over a limited area at the apex. The sound heard at the base of the heart is usually rather long; when it is short and gushing there is (it is claimed) reason to infer an extensive lesion. It is stated that it is also unfavorable to find the murmur audible only in the midsternal region. Sometimes the murmur has a distinctly musical quality. This is explained as due to the perforation of a valve-segment in such a way that a thin strip of valve is left intact and made to vibrate by the regurgitating blood. Frequently there is an accompanying systolic apex-murmur, due to relative incompetency of the mitral valve, although, of course, it may be a sign of coexistent mitral disease.

Usually there is at the base a systolic murmur, and this occurs independently of aortic stenosis. One explanation of its development is that the first outflow of blood from the contracting ventricle meets the still regurgitating current falling through the incompetent valve, and thus gives rise to the murmur.

The diastolic murmur may sometimes be heard, as already stated, in the peripheral arteries. Sometimes the second sound of the heart may be heard in the carotid when not audible at the base of the heart. If so, its interpretation is favorable as implying a lesser lesion of the aortic valves. Sometimes a systolic and diastolic murmur may be heard in the femoral and other arteries (Duroziez). This is obtained by a slight pressure with the stethoscope, and is due to the outward current of blood causing a systolic, and the returning blood a diastolic, sound, at the place of artificial stenosis. This is a very important diagnostic factor when found, but it is not always present in aortic regurgitation.

The femoral artery, and also the smaller arteries, such as the dorsalis pedis and the radial, usually afford a peculiar, sharp valvular "pistol-shot" sound with each cardiac systole. This sound may exceptionally be doubled.

The pulse is characteristic. It has been called the "water-hammer" pulse, or the "Corrigan" pulse, after Corrigan, who admirably described it, or the "shuttle" pulse. It is very quick and abrupt, and extremely ill sustained. These characteristics are more evident if the arm is raised vertically, and they can be well appreciated by grasping the wrist with the hand (Osler) instead of by the ordinary mode of palpation with the finger. In this disease there is also a capillary pulse: a phenomenon which may also be observed in neurasthenia and profound

anæmia, but much less often. It can be seen in the nails, in the vessels of the retina through the ophthalmoscope, upon a surface artificially reddened by firm rubbing as on the forehead, and it may also be well observed through a microscopical glass slide placed upon the everted lower lip. It consists of an alternate flushing and paling of the part, corresponding with the sudden filling and emptying of the vessels.

In rare instances there is even a centripetal venous pulse, seen best on the back of the hand.

Diagnosis.—As already stated, persons may have aortic regurgitation without symptoms; hence the disease may sometimes be discovered only upon physical examination. When the signs above enumerated have been detected, there is scarcely any doubt about the diagnosis.

A diastolic murmur at the base of the heart may be occasioned by an enlargement of the aorta, due to aneurism, but this lesion would have a different history and would present other signs peculiar to itself. Moreover, aneurism usually gives a systolic, rather than a diastolic, murmur. Examination with the x-ray would be conclusive.

Insufficiency of the pulmonary valves is a very rare lesion, and, if present, the murmur caused by it should be transmitted downward and to the right, and there would be no hypertrophy of the left ventricle or "water-hammer" pulse.

Patency of the ductus arteriosus is a rare condition, and the murmur associated with it has been described as "late systolic" or, again, as "continuous with the second sound, transmitted only very feebly to the left, and of a wavy character, sufficient of itself to distinguish it from an aortic regurgitant murmur."

Etiology.—Aortic regurgitation is seen

most often in middle-aged, vigorous men accustomed to considerable muscular exertion. It may be caused by endocarditis, but is more often of insidious origin in connection with habitual overstrain, and with the poison of gout, alcohol, or syphilis.

Atheroma of the aorta may extend into and deteriorate the valves.

The valves may be congenitally affected. In most such cases they are still competent at birth; but they are apt to become impaired in later life.

Ulcerative endocarditis may produce a sudden incompetency of the valve, with great and perhaps fatal embarrassment of the cardiac circulation, as already mentioned. And, finally, sudden muscular strain may produce a rupture of one of the segments, especially if the valve is previously impaired by disease.

Pathology.—Besides the usual changes in the valves themselves, there are lesions peculiar to aortic regurgitation in the heart and blood-vessels. As already stated, the heart becomes enormously hypertrophied, weighing 40 to 45 ounces instead of 10 or 12. The main part of this increase is in the walls of the left ventricle, the cavity of which is enlarged, but its walls more than proportionately thickened. The muscular trabeculae of the ventricle are usually more or less flattened where the regurgitant blood-current impinges upon them.

While in all kinds of valvular lesions the heart is exposed to ultimate degenerative changes, this liability is particularly great in aortic regurgitation, because the coronary arteries upon which the nutrition of the heart-wall depends, originating, as they do, at the base of the semilunar valves, no longer have a normal amount of blood forced into them. Moreover, if the lesion of the valves is due to fibrotic changes, the orifices of

the coronary arteries are apt to be involved in this process and more or less occluded. Hence those cases of aortic regurgitation have a decidedly better prognosis which are due to rheumatism than those which are associated with atheroma.

The systemic arteries become dilated by the large volume of blood which is thrown into them with each contraction of the enormous left ventricle, and they also undergo sclerotic degeneration because of the strain which they experience.

Prognosis.—Aortic regurgitation is the most dangerous of the acquired valvular lesions of the heart. It is consistent with comfort and vigor lasting for years, but there is always the possibility of a sudden fatal termination; and, when once compensation has been interrupted, it is seldom satisfactorily restored. Sometimes upon the development of secondary mitral insufficiency there will be a noticeable alleviation of the cardiac embarrassment, but the patient is reprieved, not saved.

Literature of '97-'98-'99.

Sudden death in heart disease occurs in about one-quarter of the cases of aortic regurgitation. Thirty fatal cases of valvular disease have been personally observed with the average age of death for mitral stenosis at 50, for mitral insufficiency at 40, and for mitral stenosis and insufficiency at 36. In 250 cases of which records have been kept, its average duration in mitral insufficiency was found to be 5.1 years, in mitral stenosis, 11.5 years, in aortic stenosis, 7 years, and in aortic insufficiency 2.3 years. The maximum duration was 17 years in mitral insufficiency, and in aortic stenosis 20 years. In aortic insufficiency it was only 4 years. The prognosis is also governed, to a certain extent, by the heart-sounds, a vigorous murmur, and first sound, being favorable. Congenital lesions usually do better than those that have been acquired. If the heart is

greatly hypertrophied, the prognosis is less favorable. If there is anæmia or emaciation, or if there is a sudden obesity, the case is graver. The duration of broken compensation is very variable. In mitral insufficiency it averages 2.6 years; in stenosis, 3.6 years; in aortic stenosis, 3.8; in aortic insufficiency, 2.75 years. Unfavorable symptoms in lost compensation are anæmia, dropsy, and dilatation of the heart; but, when it occurs, the patients are usually more amenable to hygienic measures. In 139 cases of the 250 no satisfactory cause could be determined. In the remaining cases 54 were due to rheumatism, 15 to atheroma, 5 to chorea, and the others apparently to infectious disease. N. S. Davis, Jr. (*Med. News*, June 17, '99).

Treatment. — When the aortic valves are diseased from causes other than endocarditis, iodide of potash in doses of 5 to 10 grains thrice daily should be given for long periods. This applies to cases of stenosis as well as regurgitation.

Some writers have advised against the use of digitalis in aortic insufficiency, fearing the bad effect of lengthening the diastole and thus affording a longer time for regurgitation; but the weight of authority is undoubtedly in favor of employing digitalis when it seems to be needed, despite this theoretical objection.

Further suggestions will be found in the article in the previous volume on DILATATION OF THE HEART, and in general remarks upon the treatment of valvular diseases, below.

Aortic Stenosis.

Definition. — A lesion of the aortic valve obstructing the normal flow of blood from the left ventricle into the aorta.

Symptoms. — Well-compensated aortic stenosis may last for years without subjective disturbances. When compensation begins to fail, the pulse may become very slow, even as slow as 50 to 25 beats

a minute, and there is a great tendency to dizziness, faintness, syncope, and epileptiform attacks. The subjects of the disease are usually elderly persons with general arterial sclerosis. Upon inspection, the heart's apex may be seen downward and to the left from its normal position; but in some instances, when there is pulmonary emphysema or an unyielding chest-wall, no cardiac impulse can be seen or even felt.

Percussion may show some enlargement of the left ventricle. Change in the right side of the heart does not ensue until the later stages of the disease.

Palpation very often detects at the base of the heart on the right side a distinct rough, systolic thrill.

Auscultation discloses a rough, long-drawn, systolic murmur, heard best in the second right interspace, of a sawing character, and transmitted into the carotids. It is followed by the second aortic sound, unless there is also a diastolic murmur, when the latter may supplant the normal valvular sound. Often there is accentuation of the second aortic sound, particularly if there be chronic degenerative changes in the kidney.

The murmur is not invariably harsh. It may exceptionally be soft and blowing, or even musical.

Diagnosis. — A systolic murmur at the base of the heart may be heard in anæmia, but this is usually in young subjects, and loud upon the left as well as upon the right side of the sternum; and it is not accompanied by the characteristic thrill nor by hypertrophy of the left ventricle. A systolic aortic murmur is heard very frequently in connection with the murmur of aortic regurgitation independent of any stenosis. This murmur is comparatively soft in character and unaccompanied by thrill. A systolic murmur may be heard in the

aortic region caused by roughening of a calcified aorta without the existence of stenosis. Here we would fail to find enlargement of the left ventricle, or the peculiarly slow, infrequent pulse of stenosis. The systolic bruit of a thoracic aneurism, heard in the same region, would be accompanied by pain, dilating tumor, x-ray shadow, and other signs of the true condition, and not associated with the peculiar pulse or with any hypertrophy of the left ventricle unless there were co-existent aortic regurgitation. A mediastinal new growth may press upon the aorta in such a way as to cause a harsh systolic murmur, but without any necessary sclerosis of the arteries, as seen in aortic stenosis, and with a tumor to be detected by percussion and by the x-ray. Moreover, the blood-count might aid here in diagnosis.

The systolic murmur of pulmonic obstruction and that of patent ductus arteriosus are not transmitted into the systemic arteries.

Etiology.—In some cases the valves appear as if the lesion might have been congenital, but almost always the disease develops late in life, and is a slow, fibrous, and calcareous change in the valves associated with degenerative changes in the whole arterial system. The left ventricle is slightly dilated, but mainly hypertrophied.

Pathology.—Sometimes there is a subvalvular stenosis because of foetal endocarditis. There may be vegetations on the valves due to endocarditis. Usually the lesion is sclerotic or calcareous. The coronary arteries may be involved, resulting in myocardial degeneration.

Prognosis.—The prognosis is comparatively favorable. Good health may be enjoyed for many years. When compensation begins to fail, sudden death, with cerebral symptoms, may occur.

Treatment.—Iodide of potash in small doses, long continued, may be of great value.

For further suggestions the reader is referred to the article in the previous volume on **DILATATION OF THE HEART** and to general remarks in regard to the treatment of valvular diseases, in following pages.

Tricuspid Regurgitation.

Definition.—Insufficiency of the right auriculo-ventricular valve.

Symptoms.—The symptoms of tricuspid regurgitation are those seen in most cases of ruptured compensation, in valvular lesions of the left side of the heart, provided the patient lives long enough. They are headache, dizziness, indigestion, scanty urine, uneasiness in the right hypochondrium, wakefulness, cyanosis, anasarca, and orthopnoea. Sometimes there is a peculiar greenish coloration of the skin, due to a slight icteric hue mingling with the cyanosis.

On physical examination we find by inspection a marked epigastric impulse, and by percussion a very extensive dullness to the right of the sternum. The characteristic murmur of tricuspid regurgitation is a soft, low, systolic murmur, heard best at the left edge of the sternum between the fourth and sixth ribs, and transmitted toward the right. It is seldom audible above the third rib. The incompetency of the tricuspid valves causes dilatation of the subclavian and cervical veins, and when this has become so great that their valves are no longer competent, the veins pulsate with every systole of the heart. This pulsation may be seen sometimes even in the axillary, thyroid, and mammary veins. The same systolic centrifugal impulse is also transmitted downward into the liver, and this organ may exhibit an expansile pulsation with every cardiac systole.

Diagnosis. — The systolic murmur of mitral regurgitation is heard upon the left side of the sternum; as a rule, loudest at the apex; and transmitted toward the left axilla. If both the mitral and the tricuspid valves are incompetent, usually upon careful use of the stethoscope an area can be found, going from left to right, where the mitral systolic murmur ceases, and on further advance toward the right an area where the tricuspid murmur begins. Moreover, the latter murmur may be different in pitch and quality from the mitral murmur.

Etiology. — Tricuspid incompetency is usually secondary to dilatation of the right ventricle because of obstruction in the pulmonary circuit. This may be due to chronic bronchitis, pulmonary emphysema, fibroid induration of the lungs, or to mitral disease. Of these two classes of causes, the pulmonary are said to be of more unfavorable prognosis. Also, tricuspid regurgitation may be directly due to endocarditis. This may exceptionally affect primarily and alone the tricuspid valve, but it is mostly secondary to trouble upon the left side of the heart. If the endocarditis is ulcerative, there may be secondary pulmonary abscesses.

Tricuspid Stenosis.

Tricuspid stenosis is an extremely rare condition, causing obstruction of the right auriculo-ventricular valve. It may be congenital, in which case it is associated with other lesions, so that the patient seldom lives long. If acquired, it is almost invariably associated with other valvular lesions, particularly mitral stenosis.

Its symptoms are cyanosis, sensitiveness to cold, dyspnœa, and palpitation. A presystolic thrill has been observed, and a presystolic murmur, heard best at the base of the xiphoid cartilage or toward the right from that point.

The etiology and pathology are not different from those of the more common valvular lesions.

The prognosis is extremely unfavorable.

Pulmonary Stenosis.

Definition. — Obstruction of the pulmonary valve.

Symptoms. — This condition is almost invariably congenital, and it is usually associated with other structural anomalies, such as persistence of the foramen ovale and of the ductus Botalli, and defects in the septum ventriculorum. Most cases come to an early termination. Life is seldom prolonged beyond fifteen years. The marked symptoms are cyanosis, dyspnœa, clubbing of the ends of the fingers, and deficient bodily development.

Upon auscultation we hear a loud, systolic murmur over a rather extensive area, but loudest in the second left interspace, and sometimes accompanied with a systolic thrill. The pulmonary second sound is weak or absent, or it may be replaced by a diastolic murmur. The systolic murmur is not transmitted into the arteries of the neck, but in some cases seems to extend toward the left shoulder.

Diagnosis. — It should be borne in mind that functional systolic murmurs may be heard in the second left interspace. They can be distinguished by the other physical signs and the age and general appearance of the patient. And it should also be remembered that sometimes the murmur of mitral regurgitation may be heard along the left edge of the sternum; but the latter murmur may also be heard in its usual position near the apex or in the back near the angle of the scapula. Moreover, the general symptom-complex would doubtless aid in distinguishing the true lesion.

Prognosis. — The prognosis is always

unfavorable. Beside the impending cardiac failure, such patients are notably predisposed to pulmonary tuberculosis.

Pulmonary Regurgitation.

Pulmonary regurgitation is an excessively rare valvular lesion which is said to be accompanied by a diastolic murmur heard best over the pulmonary area, and transmitted downward and toward the xiphoid cartilage. It is usually associated with pulmonary stenosis or with some lesion on the left side of the heart. As distinguished from aortic regurgitation, it does not present the arterial and capillary symptoms of that disease, nor the striking hypertrophy of the left ventricle.

High pressure in the pulmonary artery may give rise to a functional leak in the pulmonary valves (Graham Steel, Barr, Gibson, and others). For instance, this may be heard in some examples of mitral stenosis. In this case we have the picture of the principal organic lesion to show us the proper diagnosis.

General Remarks Upon the Treatment of Valvular Diseases.

Our first effort must be to promote and maintain perfect compensation of the valvular lesions. Our most important means to this end is control of the diet and of the bodily and mental activities. The diet should be simple, nutritious, easily digested, and the amount taken at any one time should be moderate. A considerable proportion of nitrogenous elements is desirable; sugar and starchy foods should be used sparingly. Thirst should mainly be quenched with pure water; this, again, is better taken frequently in moderate amounts than in excessive draughts. Tea is to be forbidden. Coffee may be enjoyed in moderate quantity if its effects do not prove unfavorable. Cocoa, milk, soups, and broths are suitable elements of the

diet. In elderly and feeble persons, and in those previously habituated to its use, a moderate amount of alcohol may be advantageous; but, in general, its daily employment is harmful. Mental strain, overwork, worry, and excitement, even if pleasurable, shorten the prognosis of comfortable existence. Physical exercise should not be summarily interdicted; its kind and amount should be most carefully determined in each individual case, and—above all—its effects alertly observed for future guidance. The moderate employment of many muscles is, of course, much better than the undertaking of special feats of strength. Walking and horseback-riding are suitable. Golf can be recommended for many patients with moderate lesions. The bicycle, if used, should be of low gear, and the patient should be warned against long journeys and against mounting hills. Facing a high wind has proved harmful, and even fatal, to cardiac patients. When ordinary exercise is no longer wise, massage and passive movements may be of great benefit; also stimulating baths, as those of Nauheim. Many patients are anæmic, and are benefited by iron, and others by arsenic; but this latter drug should not be used where there is any suspicion of tendency to fatty degeneration. Cases which evince a liability to pulmonary disturbance (especially mitral diseases) should be guarded against exposure to cold and wet.

If sudden cardiac failure develops, particularly in mitral cases, the abstraction of ten or twenty ounces of blood may save life. If the symptoms are less urgent, analogous relief may be obtained by a purge, in which case calomel seems particularly efficacious.

When the signs of failing compensation are more gradual, our best remedy is complete rest in bed. A fortnight or

two thus spent may fully restore compensation, independently of any drugs.

In cases which have advanced still farther downward, either in spite of or before our ministrations, the treatment becomes the same as that already described at length in the article on DILATATION OF THE HEART; but, for the sake of completeness, it may be said that our best cardiac stimulant is digitalis. This is indicated when the heart's action is feeble and ineffective, particularly if rapid and irregular.

If there is considerable dropsy, digitalis will work to much better advantage if preceded by free purgation with calomel, blue mass, or a concentrated solution of sulphate of magnesia. The mercurials seem to possess a peculiar power of dilating the arterioles, which other purgatives do not have. Digitalis is much more effective if great bodily quiet is enforced during its administration. If given at all, its dose should be such as experience finds suitable in the particular case in hand. If an ordinary dose does not seem to be of much benefit, gradually-increasing amounts should be given until either there is improvement in the pulse or some toxic effect appears.

Nausea and diminution in the amount of urine are signs that the drug had better be omitted. Some excellent observers believe that better results can be obtained from the use of the digitalis-leaves themselves, or an infusion made from them, than from the tincture. An easy way to obtain a fresh infusion for the patient is to order powders of digitalis, each one of sufficient size to make an infusion for twenty-four hours' use. No alkaloid of this drug appears to represent all its beneficent powers. In some instances, where there was obstinate vomiting, digitalis has been given with advantage by

enema. When the heart appears to have come under its influence, we must be prepared to interrupt its administration as soon as there is any diminution in the secretion of urine or tendency to nausea or to a fresh irregularity of the pulse.

If digitalis, after a careful and persistent trial, proves unavailing, recourse may be had to tincture of strophanthus, caffeine, sparteine, adonidin, or convallaria majalis; but, unfortunately, these are seldom of great advantage. Strychnine is a valuable, general, and cardiac tonic. It may be used to supplement other treatment, and also subcutaneously in case of dangerous collapse.

Nitroglycerin will often give great relief to cardiac distress and to dyspnoea, particularly where the pulse is hard or where there is cyanosis.

In case of marked dropsy diuretin will sometimes prove very valuable. Another suitable remedy is a pill composed of 1 grain each of squill, digitalis, and blue mass, administered three times a day. If the kidneys are practically intact, calomel may be administered as a diuretic in the dose of 3 grains every three hours until effect: either decided purging or marked diuresis. The likelihood of purging may be diminished by combining, with this dose of calomel, opium in the amount of $\frac{1}{2}$ to 1 grain. In case there is a considerable collection of fluid in one or more of the serous cavities of the body, aspiration may give great temporary relief and enable the heart to recover some of its lost power; and, when the legs are extremely œdematous, the use of Southey's tubes or scarifications under strictly antiseptic precautions may be of great advantage.

HERMAN F. VICKERY,

Boston.

VARICELLA.

Synonym.—Chicken-pox.

Definition.—A mild, contagious, eruptive fever, occurring chiefly during childhood and youth. The name varicella was applied to this disease early in medical history, before it had been fully differentiated from variola.

Symptoms.—After a period of incubation, varying, in different cases, from ten to seventeen days, the child generally feels slight chilliness. This is followed by two or three degrees of increased temperature, slight pains in the head and back, and general lassitude. In twenty-four or thirty-six hours a strictly vesicular eruption appears more upon the trunk of the body, but some on the face and neck. The feverish symptoms continue, and new vesicles appear, especially on the face and scalp, for three days, when new vesicles cease to appear and the general feelings of indisposition quickly disappear. The vesicles have no hard or indurated base, are mostly ovoid in shape, and filled with a slightly-turbid serum.

They never become confluent, and are at no time surrounded by a red areola of inflammation and tumefaction. Each vesicle begins to shrivel or dry up in twenty-four or thirty-six hours after it appears, and forms a thin, light-brown scab. Consequently the first vesicles are often seen dry when the later ones are just appearing. In five or six days the eruption has all become dry and the scabs fall off, generally leaving no indentations or permanent scars. In a small percentage of the cases, however, a very few distinctly pitted and permanent scars have been left, these probably resulting from scratching or otherwise causing inflammation to extend deeper into the cutis vera. The duration of the disease from the first indications of fever to complete convalescence is generally from

seven to ten days. Very rarely the vesicles appear in the mouth and fauces, and cause much annoyance to the child in eating. In a large proportion of cases the appearance of vesicles on the skin is preceded a few hours by small, red spots. A very few cases have been reported in which the eruption has presented an hæmorrhagic condition. Cases have also been recorded in tuberculous, anæmic, and otherwise unhealthy children, and leaving gangrenous, phagedænic, or troublesome sores. But varicella occurring in previously healthy children rarely is followed by any troublesome sequelæ.

Diagnosis.—The chief interest connected with cases of varicella is in its diagnosis or correct differentiation from the exanthematous fevers: rubeola and scarlatina, on one side, and from variola on the other. From rubeola it is at once distinguished by the absence of cough and catarrhal symptoms and the appearance of eruption on the second instead of the fourth day. From scarlatina it is distinguished by the mildness of the febrile symptoms and the absence of intense redness and soreness in the fauces; and from both it and rubeola by the eruption appearing in plain, scattered vesicles containing fluid instead of mere red points or exanthems. From variola it is differentiated by the absence of three full days of active fever and severe pain in the back and head before the eruption appears. The latter presents at once an oval vesicle without any hard, elevated base as in variola; and as it progresses it begins to shrivel, then dries up in two days, and has disappeared before a variolous papule would have completed its development into a pustule. An attack of varicella affords no immunity from variola, neither does an attack of variola, varioloid, or vaccinia afford immunity to varicella. There are, therefore, no etio-

logical relations between chicken-pox and small-pox.

Etiology.—There are no known causes of varicella other than its own special contagium evolved in the body of the sick, and communicated to those with whom they may be in contact. It prevails chiefly among children, and in epidemic periods, only seldom attacking persons during adult life.

Prognosis.—Uncomplicated varicella rarely, if ever, terminates fatally.

Treatment.—Rest, in clean, well-ventilated rooms, at a comfortable temperature, with a plain, digestible diet, and strict personal cleanliness, is all the treatment required in a very large majority of cases of varicella. If a case is met with during the eruptive stage with scanty and high-colored urine and inactive bowels, a solution of bitartrate of potassium in cold water and rendered palatable by the addition of sugar, may be given in doses suited to the age of the patient until the kidneys act more freely and the bowels are moved.

If the vesicles appear so numerous on the face as to cause much heat or discomfort, they may be kept moist with an equal mixture of glycerin and rose-water.

N. S. DAVIS,
Chicago.

VARIOLA (SMALL-POX), VACCINATION, AND VARIOLOID.

Variola.

Definition.—An acute general febrile affection accompanied by characteristic eruptions on the cutaneous surface and propagated by a specific contagium.

Symptoms.—After a period of incubation varying from nine to fourteen days the active symptoms of variola commence abruptly by a chill of varying degrees of severity, from mere chilliness to profound cold, continuing half an hour

or more, during which the face is pale, with a leaden hue of the prolabia and fingers; respirations unsteady; pulse small, frequent, and variable; severe pain in the loins, extending in severe cases to the head and epigastrium, with vomiting. At the end of the cold stage active febrile reaction supervenes; the face becomes flushed with suffused redness; the skin generally hot and dry; pulse moderately full and frequent; respirations accelerated; pains in the back and head more severe; epigastric distress and vomiting more frequent, with great restlessness and sometimes delirium. The tongue is generally covered with a white fur, the bowels inactive, and the urine scanty and high colored.

Literature of '97-'98-'99.

Study of the urine of 1400 cases of small-pox, showing that albuminuria should be considered an almost constant accompaniment of small-pox. Positive reactions were obtained in 95 per cent. of the cases, and in 32 per cent. abundant quantities were present. The maximum amount corresponded in general to the early febrile period. Rarely the curve of the albuminuria reaches its acme at the time of suppuration or during desquamation. Such cases were of more unfavorable prognosis, and frequently had an exacerbation of the albuminuria during convalescence. It was frequently observed that there was an increase in the amount of albumin at the time of the urinary crisis and under the influence of increase in diet or of leaving the bed. Albuminuria persisted in 75 out of 100 cases in small amounts, even during convalescence. As a general rule, albuminuria is more abundant in grave cases, and the grade of the albuminuria is a useful factor in prognosis.

It is believed that the albuminuria of small-pox is not simply functional, but due to an alteration of the renal tissue.

The inflammation of the kidneys is susceptible of recovery in mild cases, but more frequently a slight permanent lesion

persists, usually a sclerosis, followed by some degeneration of the epithelium, and with this there exists albuminuria or a tendency to albuminuria. François Arnaud (*Revue de Méd.*, May 10, '98).

All the foregoing febrile symptoms generally increase in intensity for three full days, when the temperature is, in many cases, from 40° to 41° C. (104° to 106° F.), and the pulse from 100 to 120 per minute and full. In all except the more malignant cases the active febrile symptoms rapidly decline during the night of the third day, and after some sleep the patient is found on the morning of the fourth day quiet, nearly free from fever and pain, the skin a little moist, and urine more abundant. At the same time there is seen on the forehead, face, sides of the neck, and over the upper part of the sternum an eruption of small, hard papules, looking like small, red spots, but distinctly elevated and hard to the touch. After a few hours there appears a small vesicle filled with water-colored serum on the apex of each papule. The eruption, thus began, continues to multiply and extend over the whole cutaneous surface, reaching the extremities nearly twenty-four hours later than on the face and neck. Both the vesicle at the apex and the hard papule on which it rests increase in size for three days, during which time each vesicle becomes filled with serum, flattened on the surface, and distinctly depressed or umbilicated in the centre. At the end of the third day of the eruption, the seventh from the initial symptoms of disease, inflammation attacks each point of eruption, causing an areola of redness around its base, with tumefaction and heat, and a return of some general fever and restlessness. At the same time the serum or virus in the vesicles begins to be turbid or less transparent,

and to accumulate in quantity for three or four days, when each vesicle loses its umbilicated appearance and becomes a pustule filled with purulent-looking fluid, and marks the completion of the suppurative stage. In cases of average severity the tumefaction accompanying this suppurative stage is sufficient to cause much swelling of the face and closure of the eyelids, and in many places the pustules merge into each other, constituting confluent patches, especially on the face, upper part of the chest, and backs of the hands. In such cases during the suppurating stage the febrile symptoms are more analogous to those of the typhoid type. The temperature ranges between 38° and 40° C. (101° to 104° F.); the pulse from 110 to 130 per minute, soft or weak; mind dull and sometimes wandering; tongue dry along the middle; bowels generally quiet, though sometimes loose; and the urine still scanty and high colored. At the end of the suppurative stage, which is from ten to twelve days after the commencement of the disease, if the case is progressing favorably, all the general febrile symptoms rapidly abate, the urine becomes more abundant, the patient takes nourishment more freely, the mind is more active, and the pustules begin to dry up, as shown by a dark-brown spot in centre of each. This brown spot increases in size from day to day, until the whole becomes a dry brown crust or scab, and the tumefaction of the surface has disappeared. The process of desiccation and cicatrization of the pustules occupies about one week, after which the scabs become rapidly detached, leaving the surface clean, but covered with depressed or pitted scars that often remain through life. Such is the usual course of an average case of variola, the whole time occupied, from the initial chill to complete

cicatrizization, being about twenty-one days. Cases, however, vary much in severity and in their results. In some the amount of eruption or number of pustules is so limited that each remains separate from its fellows throughout the course of the disease, though each passes through the several stages described. But the suppurative stage is accompanied by less swelling of the face and less secondary fever, as well as less general prostration. Such cases are called distinct, or discrete, small-pox, and constitute the mildest variety of the unmodified form of the disease. On the other hand, many cases occur in which the premonitory fever is more intense, and the eruption so copious that in its development the pustules coalesce or become confluent over the greater part of the cutaneous surface; some pustules appear also in the mouth and fauces, thereby adding much to the discomfort of the patients; and with the commencement of the suppurative stage the respiration becomes unsteady and sometimes sighing; the pulse from 120 to 140, small and weak; temperature from 41° to 43° C. (106° to 110° F.); and much delirium. At this stage in many of these cases petechial or hæmorrhagic spots appear upon the surface, or blood oozes from the gums, or sudden and copious hæmorrhage from the bowels occurs, followed by speedy collapse and death before the end of the suppurative stage. In other cases of the confluent variety, with the commencement of the suppurative stage, pneumonia supervenes and determines a fatal result before the end of the second week in the progress of the disease, though some cases recover.

There is still another class of cases of variola which have been properly called malignant. These cases are characterized by extreme depression of all vital

functions from the initial chill to the end. The patient suddenly becomes cold, with blueness or leaden hue of the surface: a very frequent, variable, and weak pulse; shallow and hurried breathing; intense pain in the loins, head, and epigastrium, with frequent retching or efforts to vomit, and constant delirium or stupor. With the febrile reaction all the symptoms named, except the coldness, are increased, and during the second day the urine is very scanty or suppressed; the matter vomited, bluish or dark color, with streaks of blood; erythematous or purplish spots appear on different parts of the surface, or, instead, the whole surface becomes covered with an exanthematous rash, with here and there a petechial spot. During the third day the anomalous spots, whether erythematous or exanthematous, begin to disappear, and the true, pointed papules of variola begin to appear; and by the following morning the entire cutaneous surface is thickly studded with them; many of them infiltrated with blood at their base, giving them a blackish appearance. But the appearance of the variolous eruption is accompanied by no subsidence of fever or general improvement, as in milder cases. On the contrary, the pulse becomes more rapid and feeble, the respirations irregular and inefficient, intestines discharge involuntarily, and renal secretion suppressed, and death follows generally between the third and sixth day of the disease. In all the severe grades of variola, during the suppurative stage and the subsequent desiccation, a very disagreeable and peculiar odor emanates from the body of the patient, making strict attention to ventilation and the use of disinfectives necessary. In the cases with numerous pustules in the mouth and fauces there is much flow of saliva, more or less pain-

ful deglutition, with some tendency to broncho-pneumonia or œdema of the glottis, especially near the completion of the suppurative stage.

Diagnosis.—An abrupt attack of active fever without previous feelings of indisposition, and characterized by suffused redness of the face and neck and intense pain in the loins, should suggest to the mind of the physician the possibility of an attack of variola. There is not, however, any positively diagnostic symptom of this disease until the appearance of the characteristic eruption, usually on the fourth day. The positive elevation and hardness of each papule constituting the eruption readily distinguishes it from any of the exanthematus fevers, while the minute vesicle on the apex of the hard papule equally distinguishes it from the larger vesicles without any hard base of varicella. The absence of cough and notable catarrhal symptoms farther separates it from rubeola.

When the variolous vesicles have progressed far enough to show the distinct umbilicated depression in the centre their diagnostic features are complete. Bacteriologists have thus far been unable to find any microbe distinctively associated with this disease.

Etiology.—The specific or essential cause of variola is a contagium generated in the body of the sick sufficient to impregnate the blood, the secretions, and the exhalations, and to render the air surrounding the patient contagious. As the disease progresses the contagion accumulates in the serum and purulent matter of the pustules, and remains active in the dry scabs and adheres to clothing. If such scabs or infected clothing are freely exposed to fresh air, the activity of the contagium gradually diminishes until it is lost; but if they

are kept in vessels or closely packed trunks or boxes they may be carried from one country to another and preserve their contagiousness a long period of time.

Pathology.—When a portion of the specific contagium or poison of variola is received into the living body susceptible to its action, it requires a period of from nine to fourteen days to multiply or develop sufficient to cause any disturbance or manifestation of its presence. When this period of incubation is completed the contagium rapidly develops an active irritative action on both nervous and vascular structures and thereby establishes a general fever of greater or less intensity. The contagium, however, by its manifest affinity for the cutaneous tissue and the mucous membrane of the mouth and fauces, rapidly finds lodgment therein to such an extent that, in a large majority of cases, the blood in from three to four days is so far relieved of its presence that all the active febrile symptoms have disappeared. But at the same time the virus at each point of its deposit in the cutis vera starts a local inflammation that presents the form of a hard elevation or papule with a minute vesicle on its apex, and goes through the subsequent stages already described under the head of symptoms. If the contagium evolved during the period of incubation is so large that it fails to find complete lodgment in the cutaneous surface, or from any other cause is retained in the blood, the fever does not subside with the appearance of the eruption, the blood rapidly undergoes deterioration, and the case soon presents a malignant aspect and death generally follows. The nature of the pathological changes produced by one impression of the variolous contagium on the human system is such that one attack of the disease renders the individual permanently

immune to subsequent attacks. In a small percentage of the cases the immunity gradually diminishes, and after several years the system again becomes susceptible to the contagium; but the second attack is generally milder and of shorter duration. Such second and modified cases have been termed *varioloid*, and seldom terminate fatally. But they evolve the genuine variolous contagium, and consequently communicate genuine unmodified variola to persons not previously protected.

Prognosis.—Unmodified variola is always a serious disease. The ratio of deaths resulting from it is much greater, in both childhood and old age, than through the middle period of life. Cases properly designated as distinct, or discrete, variola quite uniformly recover.

Cases presenting only a limited degree of confluence of the pustules on the face and backs of the hands also tend toward recovery, unless pulmonary or renal complications occur. But cases presenting a very general confluence of the eruption or strongly hæmorrhagic and other symptoms of malignancy, result in a high ratio of mortality. The existence of pregnancy in females increases the danger of a fatal result to the mother, often preceded by abortion or premature delivery. Considering all grades of the disease as they occur in different epidemics and in various countries, the ratio of deaths may be said to vary from 10 to 50 per cent. of the whole number of attacks. The chief complications that influence the ratio of mortality are pneumonia, uræmia from renal congestion, endocarditis, intestinal hæmorrhage, and cedema of the glottis.

Treatment.—As variola is well known to be caused by a specific poison or contagium which requires a period of incubation or evolution of from one to two

weeks before any symptoms of disease become manifest, this is evidently the time when by a prompt resort to vaccination and active administration of such antidotes or antiseptics as the hyposulphites of sodium or calcium we might expect to prevent, or, at least, greatly lessen the amount of contagium evolved, and thereby either wholly prevent the attack or render it so mild as not to jeopard the life of the patient. Unfortunately but few patients seek medical advice during the period of incubation or even know that they have imbibed the contagium until its evolution is complete and active febrile symptoms have commenced. And, in the relatively few cases in which the time of exposure to the contagium is known and medical advice is sought early, immediate vaccination with cow-pox virus is generally the only remedial agency resorted to. This, though of the utmost importance if practiced efficiently during the first five or six days of the incubative period, is generally of no use when resorted to later in that period. But there is much evidence in favor of doing more than this. Through the whole period of incubation the patient should abstain entirely from the use of alcoholic drinks; eat moderately of plain, digestible food; sleep in clean, well-ventilated rooms; take a fair amount of exercise in the open air daily; and see that the functions of the skin, kidneys, and liver are maintained at their natural degree of activity. But all violent evacuating measures should be avoided, and also all excessive fatigue of body or mind.

That such attention to strictly hygienic measures during the whole period of incubation is capable of rendering the active stage of the disease much milder is shown by the marked diminution of mortality from the disease in Europe

after the introduction of the practice of inoculation by Lady Mary Wortley Montagu in 1718. This practice consisted in inoculating persons when in good health with the virus of variola and keeping them under good sanitary and hygienic regulations through all subsequent stages of their progress, and resulted in rendering the disease so much milder that the practice was applied extensively to new recruits of armies, before permitting them to enter upon important campaigns. During our own war for independence many of the new regiments were held in well-regulated camps and subjected to inoculation and rigid care until convalescence was completed, and the statistics show but a very small ratio of mortality, while the immunity acquired was as durable and complete as when the disease had been taken in the natural way. The discovery and demonstration of the protective power of cow-pox virus by Edward Jenner in 1798 very soon rendered all further inoculations with variolous virus unnecessary and unjustifiable, but it did not warrant the neglect of careful attention to the proper management of all patients during the incubative stage of variola.

During an unusual prevalence of variola in Chicago between 1850 and 1860, an opportunity was afforded in several cases to control the management of the greater part of the incubative period, and in addition to immediate vaccination and proper attention to hygienic rules each adult was required to take from 10 to 15 grains of hyposulphite of sodium dissolved in mint-water, less, in proportion, to children, three or four times a day, for the purpose of preventing or, at least, lessening the evolution of contagium in the system. In some of the cases the vaccination took sufficiently early to prevent the development of vari-

ola. In other cases it was practiced too late and did not take effect. But, in every instance thus treated, if variola followed it presented only a mild aspect and terminated in recovery. In two instances coming under my observation in which two women, each with a nursing child, lived continuously in the same rooms with two cases of well-marked variola throughout the whole course of the disease. Both mothers had been rendered immune from having had varioloid in their youth. The infants, however, had not been vaccinated, but had been fully exposed to the active stage of variola three days before their condition had been discovered. They were immediately vaccinated, given each 3 grains of hyposulphite of sodium three times a day; their only diet was their mothers' milk; the rooms were kept as clean and as well ventilated as possible, while the mothers continued to care for those sick with variola in the same rooms. The vaccination did not produce any effect, and both infants continued in good health, neither presenting any symptom of fever or eruption.

When the stage of incubation has passed and the evolution of variolous virus has been completed, producing a fever of greater or less intensity, the leading objects to be accomplished in the management are: 1. To secure as complete isolation of the patient as possible, either in his own room or by direct removal to a hospital for such cases. 2. To exclude from the room all unnecessary furniture and clothing, and to maintain strict cleanliness, ample ventilation, and disinfection. 3. To lessen the intensity of the fever and mitigate the severity of pains and restlessness, and at the same time to promote natural excreting activity of the skin, kidneys, and other secretory organs. 4. To sustain

the patient by simple nourishment suitable for the several stages of the disease. The best means for accomplishing the third object just named during the pre-eruptive fever are frequent sponging of the surface with cool water and the giving of a gelatin capsule containing 1 grain of calomel and $\frac{1}{4}$ grain of morphine sulphate, every four hours, and 2 minims of tincture of aconite-root half-way between the capsules. At the end of twenty-four hours, if the bowels have not moved, instead of continuing the capsules give the patient sufficient liquid citrate of magnesia to move the bowels moderately, or accomplish the same purpose by rectal enemas of warm water containing a little chloride of sodium. If, when the eruption of variolous papules appears on the surface, the active febrile symptoms and the pains in the back and head disappear, all active internal medication should be discontinued and strict attention given to the administration of simple nourishment, consisting chiefly of good milk and plain meat-broths salted to suit the taste of the patient, and the maintenance of rigid sanitation. When, on the third or fourth day of eruption, inflammation supervenes, with only a very moderate rise of temperature and there is but little or no confluence of the pustules, the same hygienic and sanitary measures, without medicine, may be continued until convalescence is established. If, however, the eruption is more copious and the suppurative stage accompanied by more fever and restlessness, from 6 to 10 grains of pulverized Dover's and 2 grains of pulverized gum-camphor may be given each evening, and 10 grains of hyposulphite of sodium with 5 minims of tincture of belladonna dissolved in mint-water may be given three times a day until the stage of desiccation

has fairly commenced. If necessary, the bowels can be moved at suitable intervals by warm salt-water enemas, and as the process of drying up and cicatrization of the pustules goes on a greater variety of food may be taken.

In the more decidedly-malignant cases—in which the pre-eruptive fever is intense, with great epigastric distress, persistent vomiting, delirium, and very scanty urine; and when the eruption appears, it is accompanied by petechial or hæmorrhagic spots and no abatement of the fever—there is but little chance or hope of averting an early fatal result. The most promising means are a cold pack, to be followed by frequent sponging of the surface to reduce the temperature and the capsule of calomel and morphine every two hours until the epigastric distress and vomiting are relieved. If the bowels are inactive they may be evacuated by large, warm, salt-water enemas. If diarrhœa already exists, it has been sometimes controlled by repeated small enemas of normal salt solution to which were added from 15 to 30 minims of tincture of opium. If the patient lives through the first week of the disease and the stomach and bowels have become quiet, the greatest care should be given to sustaining him with small and frequent doses of good milk alternated with meat-broth well salted: a dose of Dover's powder and camphor at evening to promote rest, and appropriate doses of strychnine and digitalis to sustain the functions of the vasomotor and respiratory nervous systems through the subsequent stages of the disease. If, during the suppurating stage of the pustules, intestinal hæmorrhage occurs, an emulsion containing suitable proportions of oil of turpentine, oil of gaultheria, and tincture of opium has afforded more relief than any other remedy I could use.

If not retained by the stomach it may be given as an enema with 2 or 3 ounces of beef-tea, and repeated soon after each evacuation. Perhaps the best external treatment of the eruption after it has become established in the skin, both for disinfection and to lessen the resulting pits or scars, is to keep the face covered with layers of surgeon's lint wet in a 1- or 2-per-cent. solution of carbolic acid, and the same solution may be applied over the whole surface once or twice a day. The nostrils should be carefully cleansed and kept as free as possible. If pustules appear in the mouth and fauces, mucilaginous and mild antiseptic gargles should be used freely. If many pustules appear on the scalp, the hair should be cut short to prevent it from becoming matted together and foul during the suppurative stage.

Literature of '97-'98-'99.

Personal experience includes 4000 cases of small-pox with an average mortality of 0.11 per cent. The chief measures in treatment consisted of plenty of ventilation, the use of cooling acid drinks, and ice. Puncturing the pustules, the use of masks, and the like were found valueless procedures. The elasticity of the skin should, instead, be improved and the tension lessened by rubbing with oil. The danger of corneal ulcers and other ocular complications is lessened by painting the inside of the eyelids with a paste made from the extract of belladonna.

In convalescence warm baths were used, with a gradual increase in the diet. In prophylaxis complete disinfection, absolute isolation, and compulsory vaccination are insisted upon. J. Moir (Edinburgh Med. Jour., June, '98).

During convalescence the patient should be bathed with slightly-warm water daily with carbolic or resinol soap until all scabs and roughness have disappeared.

Vaccinia (Cow-pox; Vaccination).

Definition.—Vaccinia is a disease of the cow, characterized by the formation of pustules containing a virus which, if properly used, is capable of rendering man more or less immune to the contagium of variola.

History.—Edward Jenner, a practicing physician of Gloucestershire, England, after a long and faithful investigation, published in 1798 a complete demonstration that the cow is sometimes attacked by a mild febrile disease accompanied by pustules on the udders filled with a serous fluid or virus which, if, by either accident or design, was introduced into a cut or abraded spot would produce the same disease in the human being, and thereby render him immune to the small-pox. He further demonstrated that the virus or lymph in the pustules produced by vaccination from the cow-pox could be perpetuated indefinitely by vaccinating with virus from one individual to another and thereby render it available for perpetual protection against the prevalence of variola, then the most dreaded scourge of the human race. The same year that Dr. Jenner published his great discovery its practice was introduced into London by Mr. Cline, and the following year, 1799, it was introduced into this country by Dr. Benjamin Waterhouse, of Boston, Mass., and in a very few years it was approved and practiced in every civilized country in the world. During the first half-century after the adoption of vaccination as a preventive of variola the vaccine-lymph, or virus, was propagated by taking it from the vaccine-vesicle on one person to vaccinate others, and it was called humanized vaccine-virus. But as time passed suspicions multiplied that the protective power diminished by the successive transmissions through the

human system, and also that it was liable to be vitiated if developed in persons affected by syphilitic or other constitutional diseases. In 1866 a case of genuine cow-pox was discovered at Beaugency in France, and under the direction of M. Depaul, of the French Academy of Medicine, the fresh virus was secured and multiplied for vaccinating from one heifer to another, for the purpose of furnishing a sufficient amount for general use. In 1870 Dr. Henry A. Martin, of Boston, Mass., obtained some of this Beaugency stock of virus and commenced keeping a number of heifers for propagating and multiplying it as pure bovine virus to be used for protective purposes instead of that which had become humanized. The success of these efforts soon led to many similar establishments, until at present the use of bovine vaccine-virus has very generally superseded that called humanized, both in this country and Europe.

Symptoms.—When a small quantity of active vaccine- or cow-pox virus is brought in contact with the cutis vera of an unprotected person by removing a portion of the cuticle, as in the familiar process of vaccination, no appreciable effect is produced until the end of the fourth day. Then, at the point of introduction, will appear a small, hard, elevated papule with a minute vesicle on its apex, very closely resembling the individual papules of variola. The papule continues to enlarge in all directions for four days, the vesicle becoming first flattened, then indented in its centre, and filled with transparent lymph or virus. During the fifth day inflammation commences, indicated by an areola of redness, swelling, and a slightly turbid appearance of the lymph in the vesicle. The swelling and redness around the pustule continue to increase

for three or four days, accompanied by slight symptoms of general fever, when a dark-brown spot appears in the centre of the pustule now fully distended with purulent fluid. From this time all feelings of general fever disappear, the areola of redness and swelling diminishes, and the dry, brown spot increases until the pustule has become replaced by a thick, brown scab, under which cicatrization takes place and the scab falls off, leaving an indented or pitted cicatrix, or scar.

The process of desiccation usually occupies from seven to nine days, making the whole time from the introduction of the virus to the complete cicatrization of the pustule about three weeks. As a rule, in vaccination, papules appear only at the points where the virus has been introduced; but in a very small percentage of cases a few papules have appeared on other parts of the surface. In no case is there developed in the system a contagium sufficient to render the disease contagious or communicable from person to person in any other way than by vaccinating with the virus.

Literature of '97-'98-'99.

Vaccination-rashes may be divided into two main groups, the first being those that arise from pure vaccine-inoculation. There may be secondary local inoculation of vaccine-eruptions that occur before vesicles form, and eruptions after the formation of vesicles, as well as sequelæ of various forms due to the irritation of vaccination, and usually occurring in predisposed subjects. The second group includes eruptions due to some admixture with the vaccine-virus, which may be introduced with the virus at the time of vaccination, causing some local disease, such as impetigo contagiosa, or constitutional disease, such as syphilis, leprosy, or tuberculosis: or these may be introduced after the vesicles have developed and ruptured and then cause conditions

like erysipelas, cellulitis, gangrene, or pyæmia. In the first group, among eruptions occurring before vesicles form, may be noted vesicular and bullous eruptions and erythema multiforme.

In the next subsection of this group may be noted the frequency of roseola and a measles-like rash and a lichen of various forms that comes out in successive crops. Purpuric rashes may occur in very cachectic children. Eczema may occur, but it should not be attributed to the vaccination unless it appears before this is completely healed. Psoriasis after vaccination is a pure curiosity. The irritation of vaccination is likely to determine the outbreak of the rash of congenital syphilis, and it is absolutely wrong to consider a syphilitic rash due to inoculation at the same time with the vaccine, unless the rash appears only about fifty days subsequent to the inoculation. Tuberculosis has been introduced with vaccine-virus, but this is extremely rare, and cannot occur when glycerinated calf-lymph is used. Robert J. Carter (*Lancet*, Aug. 20, '98).

Diagnosis.—The diagnostic features of the true vaccine-sore are seen in its exact similarity to the distinct or separate sore of unmodified variola. It passes through the same stages, in the same order, and in about the same time, but attains a larger size.

Etiology.—The cause or causes capable of producing the original cow-pox as a bovine disease are not known with certainty. The close similarity of the sores of cow-pox and variola and the power of the virus of those of the former to render the human subject immune to the contagium of the latter caused many members of the profession to regard the disease in the cow as produced by the variola contagium which in passing through the cow was so modified as to lose its virulence while retaining its immunizing power.

Several experimental investigations have been prosecuted to demonstrate

the correctness of this view, but with results sufficiently variable to leave the subject still not settled or free from doubt. Without attempting to decide the question as to the origin or essential cause of the cow-pox disease, we may assume with great positiveness that the lymph or virus from the cow-pox vesicle, if properly used, affords a reliable protection from attacks of variola in all its forms. The questions of great practical importance then are: 1. What is the best method of propagating and preserving the cow-pox virus in a pure and active condition ready for use? 2. At what age should vaccination be first practiced, and how often should it be repeated to secure reliable immunity from an attack of variola.

In answering the first question it must be admitted that the best method of propagating the virus is from heifer to heifer, in well-arranged establishments conducted with strict regard to sanitary and aseptic precautions, and on heifers in good health. The best time to secure the virus is on the eighth day after vaccination, just before it begins to look turbid in the vesicle. If it is received into sterilized capillary glass tubes and hermetically sealed it will preserve its activity an indefinite period of time and may be transmitted to any country or climate. But for early use it has been found most convenient to receive it dried on ivory points sufficiently sharp to use for incising the cuticle. By dipping the point in clean water and making the incisions to the cutis vera and rubbing the abraded surface with that part of the point covered with the virus and then let it remain uncovered until dry, enough is generally introduced to insure the appearance of the vaccine-sore at the end of four days. It is thought by many that the making of two or three vaccine-

sores afforded more perfect immunity than only one.

Literature of '97-'98-'99.

In order to perform an aseptic vaccination, the child's arm is first sterilized for some distance around the vaccine-site, and, after introducing the lymph, the skin is covered over and around the parts, with hot boric gelatin, which rapidly sets into a transparent film, through which the progress of the vesicles can be observed. On the eighth day the film is quite easily peeled off; the vesicles are then dusted over with boric-acid powder, after which another and thicker layer of the gelatin is applied, and, while setting, daubed with cotton-wool. Occasionally the contents of the vesicles ooze through the film of gelatin, necessitating a second dusting of boric powder. Sinclair (Brit. Med. Jour., Jan. 1, '98).

The part of the body preferable for the vaccination is that of the insertion of the deltoid of either arm. When the leg is vaccinated (possibly on account of the greater difficulty of keeping it quiet and clean) inflammatory complications are more frequently present and are apt to be more severe. The skin at the place chosen should be made clean. The scarification should be made with a sterile instrument. The Department of Health recommends the use of an ordinary cambric needle, because a new one may be used for each case and there is thus no possibility of the transference of an infection from one person to another. When, however, the necessary precautions can be taken to render the instrument aseptic, any other sharp instrument serves as well. It is of great importance that the scarified area should not be more than one-eighth of an inch square. The virus should be rubbed in thoroughly and allowed to dry for at least ten minutes. It is a convenience to blow the virus from the capillary tube in which it is contained on to the accompanying piece of wood and then rub the wood on the scarified area, instead of blowing the virus directly upon that area. N. Y. City Board of Health (Jour. Amer. Med. Assoc., Sept. 17, '98).

Vaccination may be robbed of its ter-

rors by the application of liquor potassæ to remove the superficial epidermis. Two or three minutes after the application is made the superficial epidermis may be wiped off with a bit of wet cotton, when a moist shining surface will remain without bleeding. The vaccine-material is now applied and allowed to dry in the usual manner. Hutchins (Jour. Amer. Med. Assoc., Apr. 23, '98).

The most recent mode of preserving the virus for use which is meeting with favor is called glycerinated lymph put up in sterilized glass tubes, convenient to use instead of the ivory points.

Concerning the second question it may be said, with much confidence, that the most appropriate and effectual times for practicing vaccination are, first, in infancy between the age of six and eighteen months; again when old enough to enter school,—i.e., at the age of seven or eight years; and a third time at the full maturity of growth,—i.e., between twenty-one and twenty-five years of age. If every child were effectually vaccinated with pure vaccine-virus during infancy, again at the commencement of school-age, and a third time in early adult life, in a few years the whole population would be rendered immune and a small-pox epidemic could not occur.

Literature of '97-'98-'99.

Germany stands alone in fulfilling in great measure the demands of hygiene, having, in consequence of the calamitous small-pox epidemic of 1870-71, enacted the law of 1874, which "makes vaccination obligatory in the first year of life and revaccination also obligatory at the tenth year." The result is that, with a population of 50,000,000, having in 1871 lost 143,000 lives by small-pox she found by her law of 1874 the mortality diminished so rapidly that to-day the disease numbers only 116 victims a year. These cases, moreover, occur almost exclusively in towns on her frontier. If it were true that a good vaccination does not protect from small-pox, we ought to find in

small-pox epidemics that the disease diffuses itself in the well-vaccinated no less than in the non-vaccinated countries. But it is not so. In 1870-71, during the Franco-German war, the two peoples interpenetrated each other, the German having its civil population vaccinated optionally, but its army completely re-vaccinated, while the French (population and army alike) were vaccinated perfunctorily. Both were attacked by small-pox; but the French army numbered 23,000 deaths by it, while the German army had only 278; and in the same tent, breathing the same air, the French wounded were heavily visited by the disease, while the German wounded, having been revaccinated, had not a single case. Bizzozero (*Med. News*, Dec. 17, '98).

In many cases the immunity conferred by the first effectual vaccination would remain through life, and the subsequent vaccinations would produce no effect. In many other cases, however, the second or third vaccinations would take effect and produce a partial or complete vaccine-sore, thereby showing that the immunity conferred by the first had been more or less impaired and the person again susceptible to variola, but generally in the mild form called varioloid. By the regular repetition of vaccination at or near the times just indicated, the gradual loss of immunity known to take place in many cases after one vaccination is detected and remedied; and the trouble and expense occasioned thereby is so trifling compared with the importance of the object to be accomplished that no person is excusable for neglecting it.

Varioloid.—Within a few years after the general resort to cow-pox vaccination for preventing variola, experience showed that, in a small percentage of those apparently well vaccinated, the immunity to variola was not complete. Such when exposed to the virus or contagium of variola took that disease, but

it passed through all its stages in a modified or mild form. Others whose vaccination rendered them wholly immune for six or seven years subsequently became susceptible, generally to the mild form, though in some cases, in which the vaccination was practiced in infancy and not repeated, exposure to variola after the middle period of life has caused severe and even fatal cases of the latter disease. The cases occurring after vaccination are designated varioloid. They are caused solely by variola contagium, and are capable of communicating that disease in all its forms to any other persons not previously fully protected. Consequently they should be carefully isolated and treated in all respects the same as unmodified cases of the mild or discrete variety of variola; and the same vigilance in their cleansing should be exercised during their convalescence.

N. S. DAVIS,
Chicago.

VASCULAR DISEASES OF THE BRAIN.—The subjects of CEREBRAL HÆMORRHAGE, ENCEPHALITIS, CEREBRAL ABSCESS, and HYDROCEPHALUS have been already treated, and hence need no further mention.

Cerebral vascular diseases might be considered as to their effects: 1. On the permeability of the vessel-walls. 2. On the vasomotor arrangements for the brain itself. 3. On the brain-tissue involved by vascular obstruction.

The main facts so far known regarding the vascular pathology of the brain hinge on the last one of these points. Hence the best basis for approaching this subject is an outline of the effects produced by blocking of each individual vessel or branch. The causes and consequences will then admit of a more concise and satisfactory handling.

In general, it may be said that the effects are somewhat proportional to the size of the vessel and the suddenness with which the block occurs. Of course, as regards the eventual amount of anatomical damage suddenness has little to do.

The anatomy and nomenclature given in the writer's article on "Vessels of the Brain" in volume viii of the "Reference Hand-book of the Medical Sciences" will here be followed.

General Symptomatology.

ARTERIES.—(a) *The Dural Arteries.*—For two reasons, obstruction in these is harmless. In the first place, they do not have to do with the brain proper, but constitute in this particular an independent system. In the second, they are not terminal vessels, but are at all points protected by ample anastomoses.

(b) *The Brain-arteries Proper.*—The main factor here is the fact that, aside from the chief trunks, all the distributing vessels are more or less terminal arteries, and in part strictly so. Consequently the area supplied by any one of them is, in case of closure (embolism, thrombosis, obliterating arteritis, or enduring [?] functional spasm), bound to undergo softening to a corresponding extent—the whole area, if a strictly terminal vessel, and a portion if only partially so.

The true terminal arteries are the perforants at the base and the small branches from the basilar directly entering the pons. But beyond the circle of Willis, all the pial arteries of much size are partially terminal.

THE INDIVIDUAL ARTERIES AND BRANCHES.—*Lenticulo-striate Artery* (One of the *Preperforating from First Part of Sylvian*).—Partial softening in shape of a wedge with its tip in the interior part of the lenticular nucleus, while its base is directed forward and

takes in the anterior two-thirds of the striate body. The wedge is formed of the anterior part of caudate, the internal capsule, and the third segment of the lenticular nucleus. Motor paralysis of the opposite side.

Lenticulo-optic Artery (also from *Sylvian*).—Softening of post-external part of lenticular nucleus, of part of internal capsule, of anterior part of thalamus, and of tail of caudate.

Perforating Arteries from Choroid Plexus.—Partial softening of thalamus, size of a pea to a filbert.

Post-external Optic Artery.—Walnut-sized softening in the subposterior part of thalamus and in the peduncle.

Precerebral plus Sylvian Artery.—Block at bifurcation of internal carotid, extending in the precerebral beyond the precommunicans. Softening of frontal, parietal, and sphenoidal lobes, the striate body, etc.: *i.e.*, of the whole territory supplied by both the precerebral and medicerebral arteries. Here we may have opposite hemiplegia; and, if on the side of the speech-centres, "total aphasia, together with an altogether unusual amount of mental degradation, in addition to blindness and loss of smell on the side of the lesion. The extramental degradation would be due to the fact of the cutting off of the blood-supply from the callosum, seeing that this is mainly supplied from the precerebral."

Precerebral Artery Alone.—Softening of the frontal convolutions and of the inner surface of the hemisphere as far as the calloso-marginal fissure.

[In Freitel and Baumgartner's case (Virchow's Archiv, '88) obstruction at the beginning of the precerebral, by cutting off fine branches to the region of the chiasm, produced partial femoral hemianopsia on that side and palsies of eye-muscles.—WILLIAM BROWNING.]

Branches of the Precerebral.—1. *Subfrontal Branches.*—Softening of orbital convolutions. No distinguishing symptoms.

2. *Interior Prefrontal Branches.*—Softening of first and of much of second frontal convolutions. Likewise part of so-called “silent” regions of brain.

3. *Posterior Branches*—Softening of remaining median surface of hemisphere supplied by precerebral artery. Crural monoplegia.

(A) *Medicerebral Artery* (in its first two centimetres, from which part are given off the preperforatings above mentioned).—Softening of whole territory of Sylvian artery (same parts as in *B*), also motor segment of internal capsule, corpus striatum (thus including lenticular and caudate nuclei), and anterior third of thalamus. The symptomatology is also practically same as in *B*, except—if possible—more pronounced and with deeper mental impairment.

(B) *Sylvian Artery, Beyond the Perforatings, or all its Branches.*—Total softening of cortical territory of Sylvian (*v. infra*: branches). Blocking here causes complete hemiplegia of opposite side (with exception of the trunk and other bilaterally acting muscles) and “total aphasia” if on the side of the speech-centres; “that is, in addition to aphasia proper there would also be agraphia, as well as complete word-deafness and word-blindness, carrying with them that amount of mental degradation which is inseparable from a blotting out of all the word-centres in the leading hemisphere.”

Cortical Branches of Sylvian Artery.—The clinical results here vary some according to the slight variation in different individuals in the extent of cortex supplied by this vessel, but even more upon the differences in the freedom of the anastomoses existing between its

branches (cortical) and those of the precerebral and post-cerebral.

1. *Subfrontal Branch.*—Softening of part of insula and of the subfrontal (Broca's) convolution. Aphasia if on the left side, without other paralytic complications.

2. *Preparietal Branch.*—Softening of foot of medifrontal and part of precentral convolutions. Agraphia if on the left.

3. *Mediparietal Branch.*—Softening of both central convolutions along the Rolandic fissure, of the anterior portion of the first parietal convolution, and of the insula. In either of the last (Nos. 2 and 3) there may be aphasia due to cutting off of subcortical tracts, paralysis of face and arm on opposite side, and paresis of opposite lower extremity. Also paralytic agraphia, if on the left. Theoretically, according to Bastian, also loss of muscular sense in the fully paralyzed parts,—though impossible to demonstrate.

4 and 5. *Post-parietal and Temporal Branches.*—Softening of the subparietal and supratemporal convolutions, and of part of the insula. Word-blindness and more or less complete word-deafness.

“It is only on rare occasions that vascular lesions are precisely limited to the seats of particular word-centres. They are much more frequently irregular in their distribution, or multiple, and thus give rise to confused or less typical forms of speech-defect.”

Post-cerebral Artery.—More or less softening of the occipital lobe, especially the cortex on its inner and under aspects, including the region of the cuneus, the hippocampal gyrus, and posterior portion of lower temporal convolutions. Hemianopsia of the opposite half of the visual field, with preservation of pupil-

lary reactions from both halves of the retinae.

Cerebellar Arteries.—Embolic and thrombotic softening here is more rare.

Vertebral Arteries.—Embolisms of the vertebral are more often on the left, due to the existence on that side of a marked constriction where the vessel discharges into the basilar, whereby emboli are caught at that point. Softening may not result. If, however, the block extends any distance along the artery (as is usually the case in thrombosis), softening in the corresponding half of the oblongata may be expected.

Basilar Artery.—Blocking of this vessel, usually thrombotic, so long as the post-communicants are patent, only produces symptoms by cutting off the small terminal branches to the pons. These are, however, important, and two types of effect are distinguished according as the block affects the upper or lower portion. Where the focus is at the upper limits of the pons, involving cerebral crus, corpora quadrigemina, and optic tract, there may be a paralysis of the extremities on one side with that of the eye-muscles on the other (hemiplegia alternans superior). Where, however, this affects the pons at the facial-nerve exit, there may be paralysis of extremities on one side with that of the facial on the opposite side (hemiplegia alternans inferior).

Embolism.

Definition.—Embolism of the brain, like that in other parts of the body, is the blocking of an artery by a plug or material sufficiently solid to stop its blood-current. It plays a more important part here because: 1. The arteries are, to a greater extent than in most other parts, terminal vessels. 2. The special functions of any destroyed part of the brain cannot be compensated; as *e.g.*, in

the lungs or spleen, where all portions act practically alike.

Varieties.—*Transient Embolism.*—In this form the occluding substance breaks up or is floated along to a place where the collaterals suffice, and this happens before death of the threatened tissues. It is believed to explain occasional transient seizures experienced by embolic subjects.

Simple Embolism.—The ordinary form, where the floating mass lodges in some artery and cuts off the whole current immediately.

Septic Embolism.—Where the embolic plug carries some infecting agent. Inasmuch as an ulcerative endocarditis may be due to the invasion of the ordinary pus-organisms (streptococci and staphylococci), gonococcus, tubercle bacilli, or even certain other micro-organisms, it follows that a plug carried to the brain may be the transporter of infection like that of its source. In such cases the reaction about the point of lodgment or in the involved area will bear some relation to the virulence of the underlying germ.

It is a notable fact that a septic cerebral embolism is far more liable than any other to form the starting-point of a hæmorrhage. It appears to start from the eroded end of the vessel.

Aneurisms of the brain-arteries in children are said to owe their origin to embolic processes.

Partial Embolism.—Where the plug, owing to its angular or irregular shape, does not at first completely block the vessel. In such case either it is soon driven along to some point where it does fully occlude the lumen, or a thrombotic deposit soon forms around it and thus completes the closure.

Symmetrical Embolisms.—The corresponding vessels on the two sides have,

in rare instances, been the seat of embolism (both medicerebrals, in Carrington's case, '84; both the medicerebrals and precerebrals on each side in Eisenbraht's, *Med. News*, '92).

Pigment and Granular Emboli.—The collections of pigment in chronic malaria are well known. Globular hyaline masses have been described by Klebs and by Manasse, and are supposed to be derived from the white corpuscles. So far as concerns chorea, however, clinical and experimental studies have disproved the theory that it is due to multiple small emboli.

Fat-embolism.—This affects primarily the lungs, but in general fat-embolism the brain-arteries may also be invaded. Only in severe cases are serious brain-symptoms produced, and fever (Scriba, '79) does not result.

Air-embolism.—The same applies as to fat-embolism. This refers only to cases where the air enters at other points in the body.

There is also the possibility of air entering through the brain-vessels; but this applies not to the arteries, but to the veins and sinuses. In Genzmer's case ('77) air to a fatal extent was aspirated through the opened longitudinal sinus. François-Franck's experiments ('81) appear to show that by way of the vertebral veins air may be taken in through the occipital diploë veins. In the Porter case (reported by the writer, "Veins of Brain," p. 71) there was some evidence that air was introduced into brain-vessels in tetanic convulsions, the wound being across the forehead. Koerner, from a case published by him in '97, concludes that in operations on the lateral sinus, where the sinus-wall shows respiratory movements, the vessel should first be closed below before venturing to open it, lest air be sucked in.

Symptoms.—These are largely dropping out of functions (*ausfall symptome*) rather than strictly positive. They are, as a rule, though not invariably, those of a sudden interruption of function of the portion of the brain involved, sudden in onset and promptly complete in effect. Rarely they deepen for hours after the onset. They necessarily vary in intensity and kind according to the extent and location of the area supplied by the vessel. Certain immediate effects may pass off, and some of the more lasting manifestations may gradually ameliorate.

There are no focal premonitions (as headache, dizziness, unilateral tinglings or numbness about the body, paresis, etc.). And previous headaches, apparently in relation to the trouble, count against embolism. Aphasia speaks in general more for embolism than for hæmorrhage, though common enough in the latter also. Development of the condition during sleep makes the probabilities against embolism.

A history of past rheumatism, especially the presence of a heart-murmur, and still more a knowledge of previous vascular plugging (in any part of the body) are strongly suggestive of embolism. To fully warrant the diagnosis, we must establish the existence of valvular disease or endocarditis at the time of the seizure, though various pulmonary and other conditions may suffice.

The occurrence of apoplexy or hemiplegia in persons under forty years of age has been supposed to indicate embolism, though there are too many exceptions to allow much value to any such age-rule.

The occurrence of coma argues against embolism; at least, embolism limited to the pallium is not attended by this symptom.—and this is its most common location.

The focal symptoms are those of the

part involved, and may include almost any loss of function seen in brain disease, though they are more often those of the left side of the brain. For the regional diagnosis (localization) these have been given in brief outline in the schedule of arteries.

Etiology.—This has been given in part under the heading VARIETIES.

The forms of verrucous and ulcerative endocarditis, yielding vegetations or other solid fragments that may become freed from their base, are the best-recognized causes of embolism. It has been found that embolism of the brain occurs in 5 per cent. of cases of valvular disease, and that this occurs twice as frequently in females as in males.

Rheumatism, gonorrhœa, chorea, scarlet fever, and septic processes of all kinds in whatever part of the body, by their tendency to endocarditis, are indirect causes of embolism. Destructive pulmonary processes, pleural irrigation, and entero-peritoneal troubles may start and free thrombi that find lodgment in the brain.

Pathology.—The main feature is the softening, and this involves all tissues so far as it goes. It may be red, white, gray, yellow, or brownish, dependent on circumstances, duration, etc. "In the early stages of embolism or thrombosis of vessels supplying the cortex, red or red-and-white softening mixed is found in the area affected; after longer periods yellow softening is met with, or what French writers term *plaques jaunes*; and, after much more prolonged periods, pseudocysts are found, owing to complete atrophy and absorption of the cerebral tissue having taken place."

It is still an open question whether all focal softening of this type is due to vascular blocking. If so, then in numerous cases either the obstructing material has

disappeared or the trouble has been an arterial spasm of sufficient severity and duration to produce the same effect. The left side, and especially the left Sylvian and its branches, is the more frequent site.

Prognosis.—Experience shows that the prospect of late improvement after embolism is as good as after cerebral hæmorrhage. In favorable locations a certain amount of collateral compensation occurs, so that a marginal zone of endangered tissue recovers a sufficient degree of supply to resume function. Moreover, many of these are young subjects in whom some substitution of function is still possible. Immediate danger to life occurs only when the area involved is great, or where essential centres in the pons are included.

Treatment.—The treatment of this condition is in most respects the direct opposite of that for cerebral hæmorrhage. Our chief usefulness is at the time of the attack; by immediate and active measures, then, great good can be accomplished.

An ideal method would be the development of a collateral circulation. But the brain-arteries are so largely terminal vessels as to preclude full compensation where an artery of much size is stopped.

Where the blocking is due to atheromatous or other soft material, it may break up sufficiently to pass on. We can only aid this by increasing the blood-pressure and tumbling the plug along.

The most available and useful way for us is to force the embolus as far along into some peripheral vessel as possible. This is accomplished by placing the head low, giving free libations of hot and stimulating drinks, applying bandages to the extremities or abdomen, and the administration of nitroglycerin or amyl-nitrite. Strophanthus may be admissible if the

heart is not acting so tumultuously as to possibly tear off another plug.

The patient should be in the fully reclining position, with the head low. All depressants, depletors, and such vascular constrictors as ergot and digitalis should be most scrupulously avoided.

The management of the case after the embolic softening has fully developed is that of hemiplegics in general. We may not remove the focus, but we can look after the general health and do much, by training the patient, to regain the full power that is left.

Thrombosis.

Definition.—Under this general heading it is convenient to include the blocking due to specific autochthonic coagulation arterial disease, obliterating endarteritis, etc. To some extent these are distinguishable conditions clinically and therapeutically, yet they have much in common. In this sense it includes all cases where local processes or disease-conditions lead to vascular occlusion and thus to the production of symptoms, if any are present. While there may be a wide difference in the origin of these cases, the final stroke usually depends on a local coagulation or deposit of material from the blood. If the vessel be previously narrowed, then, of course, much less will suffice to block it.

Varieties.—There is, in the first place, a wide distinction between arterial and venous thrombosis.

Arterial.—This presents several sub-forms:—

1. One is due to conditions of the blood favoring the formation of clot (leucocytosis, increase of coagulation-ferment), as in chlorosis and the puerperium; or to a thickening of the blood and slowing of its current, as in certain diseases attended by debility and exhaustion.

2. Due to trauma, ligature (as in Marchand's case, '94, where fatal thrombosis of the Sylvian artery extended up from a ligation of the carotid), adjacent inflammations, and encroachments or compression, as by neoplasm. The traumatic cause may be either operative or accidental. According to Gerhardt, thrombosis in the branches of the Sylvian artery may occur in tubercular meningitis and thus account for the hemiplegic symptoms in some of those cases.

Otherwise this form is so rare as to merit merely enumeration. The causes of both Form 1 and Form 2 act even more frequently to produce sinus-thrombosis.

3. That due to syphilitic arteritis. Here the progressive narrowing of the arterial lumen at length reaches such a degree as either to cut off directly the blood-current or to slow it so that coagulation occurs.

4. The atheromatous and allied changes of the arterial wall found in the aged, acting in much the same way as the specific form. The arteriosclerosis of nephritis might be supposed to favor thrombosis, but the accompanying increase in blood-pressure serves largely to prevent this; hæmorrhage is the far more frequent result. Gout and rheumatism are favoring antecedents.

Symptoms.—In general, these are gradual in onset and for a time progressive in character. In contrast to this is the fact that there are no prodromata in embolism and at least much less tendency to them in hæmorrhage. The age, general condition, and personal history of the patient give us all-important aids to diagnosis.

Loss of consciousness is not the rule in thrombosis, or not until the condition is so far advanced as to approach a fatal ending. There is a tendency to a slowing

of the pulse. It may still vary considerably from time to time, and may increase, of course, if there is any complicating sepsis. This slowing occurs, no matter what part of the brain is especially involved, though, doubtless, it is more pronounced when the basilar is the seat,—and there is a possibility that in all cases where present it is due to participation of that vessel.

Fever is not an accompaniment of the thrombotic process in itself, and occurs only secondary to some outside inflammation or to septic disintegration of the thrombus itself. Barring sepsis, there is, on the contrary, an inclination to subnormal temperature, though this feature will take an irregular course. “Yawning, and especially sighing, at times in respiration are frequent and noticeable symptoms in thrombosis and its precedent conditions, though also common in advanced cerebral hæmorrhage.”

The fact that compression of the carotids may aggravate existing symptoms and even bring on slight convulsions in persons suffering from impairment of the brain-circulation, especially thrombotic plugging of the basilar (Griesinger's syndrome), has suggested it as an expedient in the diagnosis of thrombosis. But as it affects disadvantageously the patient's cerebral condition, and possibly involves injury to an old person's carotids, it is generally discountenanced.

Occasionally, in persons of some intellectuality, it is quite possible to locate the trouble in the field of one or more arteries, preferably the Sylvian or its branches (for which purpose compare the schedule of arteries above given).

In the autochthonic form (due to overcoagulability of the blood, retardation of the current, etc.) there may be no distinct forerunners, but only a progressive increase in symptoms and severity. This

developmental stage may be very short if the process is limited to a single vessel, or may steadily increase to a fatal termination if it extends to other vessels, for the conditions which started the process may continue to extend it. “Aphasic and amnesic defects of speech have been met with occasionally during or after acute specific diseases, or during the puerperal state; and in all such cases a thrombosis partial or complete of the left cerebral artery is the most common cause” (Gerhardt), though the same causes may favor embolism.

In the other two chief forms we have a history of past syphilis or a senile subject usually advanced in years to give us a distinct clue. Here prolonged and wavering prodromata, especially if diffuse or scattering and not focal, strongly suggest thrombosis. There are frequently such warnings and forerunners of various kinds. Transitory paræsthesiæ (tinglings, numbness, etc.), pareses, aphasic spells, twitchings, headaches, visual obscurations, cardiac and respiratory irregularities, lapses of memory, mental hebetude, dizziness, etc., according to the location and extent of the threatened area, are more or less frequent. If unilateral in type, they are the more in evidence. These, at times, last over a period of weeks or months, but often are of a few days' or less duration. “The physiologically-recurring waves of vessel-contraction and diurnal or other periods of fall in blood-pressure, added to the pathological narrowing of the vessel (where there is danger of thrombosis) may evidently, for a time, limit the nourishment of the respective area sufficiently to impair its function without actually causing necrosis. The tissues are still supplied with enough to keep them alive, and as soon as the flow again increases these resume their functions. Presently,

however, if relief is not obtained, the matter goes too far, and irreparable softening ensues." In some of these cases conditions of *astasia-abasia*, *dyslexia*, etc., are noticeable. In reading, writing, muscular or other effort there is a quick tiring of function. "The centres act normally for a brief period, then *flag out*." This may apply to large areas or almost the whole brain, again is more one-sided or even further limited.

Some authorities claim that the specific form is usually limited to a single vessel or a few branches, and hence is focal in character, but to this there are certainly many exceptions. In the senile type, however, the process is widely distributed, and hence the manifestations are more general and diffuse. This applies more especially to the prodromata and general features than to the symptoms following the softening,—which latter necessarily represent one or more distinct foci.

"In the specific form, which may occur at almost any period of life, there may, or oftener may not, be much headache; if especially nocturnal, so much the more in evidence." Ophthalmologists recognize a *chorioretinitis syphilitica* as analogous to specific diseases of the brain-arteries. In suspected cases lacking a definite history of syphilis, a careful search must be made for any marks about the body or other indications pointing or not to that diagnosis.

Etiology.—Certain general influences play a secondary rôle. All debilitating and wasting diseases, by weakening the circulatory force and by reduction of the traversing fluid, have such a tendency. Excessively warm weather, a rapid rise in the atmospheric temperature, and marked fall of the barometric pressure favor the occurrence of thrombosis, while opposed to cerebral hæmorrhage. Senil-

ity also acts in the same sense, as well as in a more direct manner.

The more immediate causes fall under two heads:—

1. Local disease of the vessel-walls. *Atheroma*, pre-eminently a disease of the old and favored by chronic alcoholism, occupies a prominent place here. It narrows the lumen of the vessel, but may also be the object around which the thrombus starts. Syphilis acts essentially by thickening of the arterial wall (*endarteritis syphilitica*, *periarteritis nodosa*, etc.); it is said to cause thrombosis chiefly in those between twenty and fifty years of age.

Sometimes the thrombosis starts in an aneurismatically-dilated artery.

2. It may be due to a strong tendency of the blood to clot (*leucocytosis* often present). This is a much less frequent cause. Gout, chlorosis, and especially the puerperium (when the vessels of the uterus have to be closed by clot) here play a rôle. In such case a practically spontaneous coagulation occurs and obstructs an otherwise healthy vessel.

Pathology.—This is, from a practical stand-point, simple, and corresponds closely to that of embolism. Inasmuch, however, as the remaining vessels are so often more or less similarly diseased in the common forms, the chances of establishing an adequate collateral circulation are not as favorable. Consequently the area of softening, for any given vessel, is rather larger. So soon as the current has been entirely cut off for a short time, a few hours or probably less, necrosis is established and the part thus affected is hopelessly lost. The later course of such a focus is the same as that after embolism.

Prognosis.—This has reference to three points:—

1. The prodromal stage. Where it is

possible to make the diagnosis and institute treatment at this stage, softening can usually be headed off. This is quite intelligible in syphilis, though there is a great tendency to recurrence. And even if the specific process is absorbed, there remains ever after a weak spot in the arterial parietes that may under strain give way and be the source of a hæmorrhage. The senile gouty and atheromatous forms are also amenable, and not infrequently seem to recover permanently. Of course, in that happy event it is not to be supposed that the artery-wall is rejuvenated, but only that things have so adjusted themselves that there are no longer active manifestations.

2. The thrombotic softening. This in itself is, as above stated, somewhat less favorable than in embolism. The tissue-loss is permanent, and function can be compensated only to a degree.

3. The tendency of the process to extend. It is difficult to be very explicit on this point. In many cases there is reason to think that numerous vessels are more or less affected by the same process and that the same dyscrasic cause continues, only that it reaches extremes in but one or two at a time. Unless very carefully managed, we may expect that sooner or later the danger-limit will be reached in some of these.

Treatment.—To be successful this must be prophylactic and directed to the prodromal stage. The trouble is of slower development than hæmorrhage or embolism, and needs be met with less vigor, but more persistence and greater skill in adaptation of means to an end. There is one danger in the measures for relief; we are dealing with diseased vessels, their walls being often much weakened; there is no such disturbing fear in embolism, for there the vessels are presumably healthy; nor in hæmorrhage,

for there our efforts at relief involve no strain on the vessels.

When we find signs of such danger impending, the first or immediate line of treatment is analogous to that in embolism, though there is less need of increasing the body-fluids. The vessels must be dilated to allow the blood to pass, and the pressure should be increased to get it through. Here, again, the nitrites are as yet our main stay, sometimes reinforced by strophanthus and strychnine. We desire the slow, continuous-acting nitrites; Bradbury ('95) found experimentally that there was a difference in this respect. In the practical use of the nitrites, however, there is one point not duly appreciated. From nitroglycerin we rarely get any stomach disturbance; but from nitrite of sodium and unfortunately also from erythrol-tetranitrate there is very often complaint of much discomfort about the region of the stomach, and it is the same in whatever way administered. The objection to these latter remedies is time and again so great that they have to be discontinued. Still, even then we can fall back on the nitroglycerin and succeed fairly well.

Avoid digitalis and everything causing arterial contraction.

As soon as immediate relief is secured a course must be adopted looking to more lasting benefit.

For atheroma, small, long-continued doses of iodide of potassium are much used; for one reason or another (slow action, the occurrence of iodism, etc.) it has rarely given much satisfaction in my experience.

The nitrites should be accompanied or followed by brucia (in doses of $\frac{1}{20}$ to $\frac{1}{10}$ grain) or its allies in stout doses, and persisted in for months with more or less regularity according to immediate needs at any time.

Another useful line of remedies depends upon the fact that most of the old patients are rheumatic, gouty, or sufferers from what might be termed senile lithæmia. Physical inactivity plays a part. Waste and refuse products of the system are not eliminated with due promptness and aggravate the atheromatous trouble.

Here alkalies and antilithic remedies have to be employed. Much aid is furnished by certain of the sulphur-waters. If it is possible for the patient to visit the springs, so much the better; otherwise the waters may be employed at home. A course of these waters can be repeated from time to time.

In the syphilitic form the whole power of our therapeutic resources should be promptly brought to bear and continued until all symptoms are well in hand. It should be borne in mind that often the so-called specifics will develop this desired local action only after the vessels have been dilated. So long as they are almost closed, it is evident that little blood, and consequently little of the medicament, can reach the imperiled point. It is necessary, if possible, to open the vessel-path, and, while keeping the way open, follow up with the more direct specifics.

Thrombosis of the Brain-veins and Sinuses.

VEINS.—Primary thrombosis of brain-veins has been but rarely observed. Hence, despite the occasional description of cases in the literature, it is impossible to present anything very systematic in regard to the matter.

Without doubt it is of greater frequency than appears from the above. The reason why it is not more recognized is that in itself it but very exceptionally causes symptoms. All the pial veins have numerous and free anastomoses, so that

serious stasis only results when whole net-works of contiguous veins are filled. In the latter event, softening of the corresponding drainage-area has been noted. In such a case a focal diagnosis is the most that one might expect to make. If other manifestations are present, they are usually due, as in sinus trouble, to sepsis rather than the thrombosis as such.

The question of terminal veins in the brain is not fully decided, though only as regards the perforatings, the prefontal efferents, and parts of the internal or Galen's system: the same parts, it may be remarked, where the arteries are strictly terminal. The balance of evidence favors the view that in these limited sections there are at least many connections between the finer branches. The practical facts as regards Galen's system will, however, be summarized in discussing the straight sinus.

More often there is a secondary venous thrombosis here, an extension backward of a like process in the sinus into which the vein empties.

Cretefaction and fatty degeneration of the parietes of these vessels also occurs, though, of course, without clinical significance. And the same applies to the endophlebitis deformans chronica described by Huber.

Sinus-thrombosis.—This is a blocking of any one or more of the several venous sinuses of the brain.

Such obstruction is, of course, never of embolic origin, but always due to thrombosis (or, in rare cases, to trauma or ligature). Neighboring septic trouble is more often a cause than in the case of the arteries, but otherwise disease of the vascular wall plays no such part as with the arteries. The causes are, however, many. In children it occurs in marasmus, cholera infantum, whooping-cough, and other conditions of extreme exhaus-

tion. In the adult, chlorosis, pregnancy and the puerperium, erysipelas (by extension, centrally, of a process starting at the surface), cholera, and like disorders that greatly reduce the body-fluids, septic processes in adjacent tissues, and any form of debility that greatly weakens the circulation. Most frequent of all are the cases of phlebitis of the lateral petrous and connecting sinuses, due to extension of inflammation from ear disease; the important features of this form belong to the ear section.

There are other less frequent forms of inflammation, starting, perhaps, in the parasinual spaces and involving the sinuses.

Symptoms.—It should be remembered that one or both jugulars may be tied, one or even both lateral sinuses closed, or almost any single sinus blocked, without the necessary production of symptoms, as has been many times shown by clinical, operative, and, in animals, experimental evidence. The only exception to this is the straight and possibly the two cavernous sinuses. In the very young, the feeble, or those otherwise exhausted, blocking of a sinus may have more effect, and be a factor in a general break-up. Such was, perhaps, the explanation in Kummer's case (Rev. de Méd., '99), where a fatal result followed ligation of one internal jugular, some hyperæmia and hæmorrhage being found in the brain.

The sinuses that are easy of access surgically are the longitudinal and the two laterals. Besides these, if it were warrantable, it would be quite possible to tie the end of a straight sinus.

Thrombosis of the brain does not lead to any definite increase of the cerebrospinal fluid, as a rule. The only exception is where the outflow through the straight sinus is interfered with, or, pos-

sibly, the venous discharge from the small fringe of choroid plexus in the angles of the fourth ventricle.

For the most part, the symptoms attributed to sinus-thrombosis are really due to the attendant sepsis or an extension of the inflammation to neighboring structures. Consequently it is only incumbent here to consider the cases where positive symptoms are due to the blocking as such.

It is claimed by Voss ('99) that a murmur can be detected in the unobstructed internal jugular vein, or that it can be produced artificially by a slight pressure of the stethoscope on the neck close to the base of the skull. If, however, the murmur is absent despite such reinforcement, while present on the other side, there must be occlusion of the sinus.

The presence or absence of a sinus pulse has no diagnostic value as regards thrombosis (Preysing, '98).

The untoward effects of closure of the straight sinus have been recently studied by the writer ("Normal and Pathological Circulation in the Central Nervous System," '97, pp. 68 and 83), and the following conclusions (pp. 90-93) drawn:—

"In cases of closure of the sinus rectus, Galen's vein, or the velar veins, three possible outcomes are to be thought of:—

"1. Full physiological compensation. There appears to be no evidence to show that perfect compensation can occur.

"2. An increase of ventricular fluid, leading to hydrocephalus.

"The ample anastomoses described, and the fact that normally this venous current has to turn several sharp angles before leaving the skull, make it, at first, unintelligible why there should ever be any trouble following the closure of the sinus rectus or its practical extension, the single trunk of Galen's vein. And, so far as concerns either the vitality of the

tissues or the function of the brain-substance and nerve-substance proper, there is nothing to show that compensation is less perfect than where other brain-veins are closed.

"The difference depends entirely on the presence, in the territory of this vein, of a peculiar structure, the choroidal tissue, occurring only in the brain-ventricles. This tissue normally produces ventricular fluid. Its activity is easily influenced by many conditions, and it responds quite naturally to any interference with the venous discharge by an increased production of fluid.

"It is, then, not primarily any venous stasis that causes symptoms, but only the secondary hydrocephalus. And the facts show that this is always bound to occur. This causes death, if at all, only after a lengthy period and in this indirect manner.

"3. Early death.

"If, however, the velars be closed (*i.e.*, the *venæ intimæ* be cut off from both their regular and collateral outlets), then, so far as present evidence goes, a speedy fatal ending is inevitable. This takes place before there is time for the development of much hydrocephalus, a small quantity of blood-tinged fluid being all that has accumulated.

"Up to 1884 the writer was able to collect three such American cases, and those from foreign sources were merely corroborative.

"It is still possible that if only the main trunk of one or both velars was obstructed, and the thrombus did not extend into any of their branches, the fatal ending might be delayed, but hardly for long."

CAVERNOUS SINUSES.—In some cases simple blocking of a cavernous sinus may not cause marked symptoms. It depends upon how much of a *confluens* it happens

to be in the individual case. Even when it receives a large basilar and a deep Sylvian branch, it is probable that other venous channels can re-establish an outlet and softening be avoided. The most definite symptoms are on the orbital side. There may be puffiness about the orbit, some distension of the veins in the same region, and even prominence of that eyeball or more lasting interference with the vision and nutrition of that eye. But all such manifestations are far more marked in septic than in simple thrombosis.

Treatment.—Where the thrombus is of septic origin or has become infected, surgical treatment is called for, the same as in any other part of the body. There is no safety or recovery until the material is removed. In cases of simple or uncomplicated thrombosis, on the other hand, direct interference is not called for; prophylaxis, if anything, is the *desideratum*.

WILLIAM BROWNING,

Brooklyn.

VASCULAR SYSTEM, DISEASES OF. Arteries, Disorders of.

Arteriosclerosis (Arteriofibrosis; Atheroma).

Definition. — Arteriosclerosis is characterized by thickening of the walls of the arteries, due to morbid changes in the intima and giving rise to localized or general narrowing of their lumen.

Three varieties of arteriosclerosis may be recognized: the *nodular*, in which the morbid changes are localized, though widely disseminated; the *senile* form, which may be localized or general, and is a manifestation of physical degeneration attending old age; and the *general* form, which may occur during middle age or even youth, through inherited predilection or as a result of various etiological factors.

Symptoms.—These depend to a great degree upon the regions which have become the seat of the morbid changes. As a rule, a high-tension pulse is indicative of arteriosclerosis; but this is not invariably the case, as high tension may exist with little or no sclerotic change. The vessel-wall is hard, and it is often

from want of sufficient blood-supply, and the symptoms are the same as those of the atrophic form of nephritis. The amount of albumin may be small and casts few.

The cerebral symptoms may consist of persistent headache, vertigo, hæmorrhage, aphasia, transient hemiplegia, and other palsies. The arcus senilis is commonly observed in cases of arteriosclerosis.

Embolus is infrequent, and is usually secondary to the cardiac complications. Spasm of the arteries, including the coronary, is thought to occur often and to account for the attacks of angina pectoris occasionally observed. The heart's rhythm and regularity are usually impaired in such cases, and the pulse may differ on the two sides. Rupture of the cardiac wall into the pericardium and death may occur during one of these seizures.

Diagnosis.—E. N. Whittier (Boston Med. and Surg. Jour., Dec. 1, '96) alludes to two periods in this disorder which are pregnant with errors in diagnosis. In

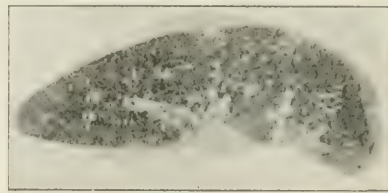


Cut surface of an arteriosclerotic, contracted kidney. (*Bondurant.*)

(*International Medical Magazine.*)

difficult to obliterate the pulse even upon firm pressure. Sphygmographic tracings show a short, sloping upstroke, a wide top, and a slow, gradual downstroke. The left ventricle becomes hypertrophied as a result of peripheral resistance. In advanced cases the apex-beat is displaced and the second sound is accentuated and ringing in character. Subjective symptoms may be absent for a variable period until the heart, kidneys, lungs, or brain call attention to the disease. Following the cardiac hypertrophy may be cardiac dilatation, with symptoms of valvular insufficiency. Dyspnea, palpitation, and initial murmur are prominent. Angina pectoris may also be noted as a complication.

When the arteries of the kidney are especially affected, this organ atrophies

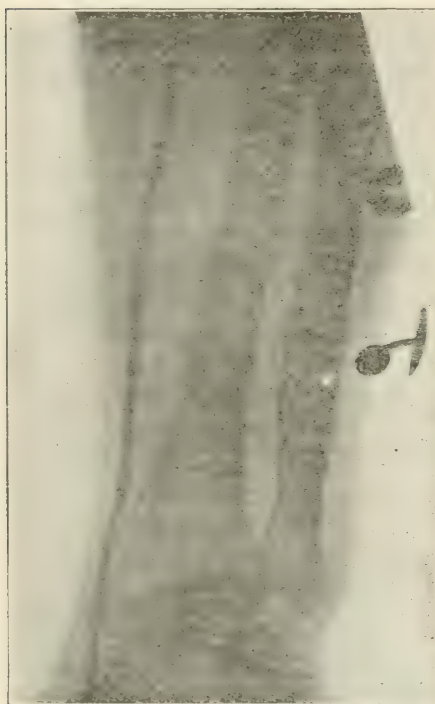


Cut surface of an arteriosclerotic, contracted spleen. (*Bondurant.*)

(*International Medical Magazine.*)

the first, there is poverty of symptoms by which localization may be accurately mapped out; in the second, such profusion of rational and physical signs, such evidences of structural changes,—cardiac, renal, and cerebral,—that the underlying and causal relation of the condition of the vascular channels may be

altogether lost sight of in the study of the effects of the arteriosclerosis. Sphygmographic tracings, as aids in the diagnosis of disorders of the circulatory apparatus, are important. Whittier found in all tracings of radial sclerosis evidence of cardiac involvement in the sharp rise, in the lessening of the primary wave, in the lifting of the tidal wave, in the lowering of the aortic notch, and in a



Diagnosis of arteriosclerosis by Roentgen rays. (Beck.)
(New York Medical Journal.)

flattening of the curves and shortening of the diastolic portion of the tracing.

Careful attention to the history of the patient with particular reference to the etiological influence of the chronic intoxications arising from alcohol, syphilis, lead, rheumatism, malaria, etc., will give the largest opportunity for correct treatment during the primary stages, and far

in advance of the time when the disease is confessedly unmanageable by reason of the secondary complications—cardiac, vasorenal, or cerebral.

In diagnosis the following points should be borne in mind: Possibility of a physiological sclerosis in old age; transitory stage of some forms of real sclerosis; pathological changes in vessel-walls, due to former diseases; increased blood-pressure under muscular work; height of blood-pressure; kind of work, and quality and quantity of food. Tschigajew (Wratsch, No. 15, '95).

The diagnosis may be facilitated by examining the extremities by means of the Roentgen rays, as shown by the annexed illustration, which represents a sciagraph obtained by Carl Beck in the case of a Cuban, 68 years of age, whose forearm is taken in pronation, the palm resting on the photographic plate. The radial artery can be recognized just below the bifurcation of the brachial artery, passing along the radial side of the forearm to the wrist, and winding around the outer side of the carpus. Particularly interesting is the grading of the shadow according to the degree of calcification of the artery.

Literature of '97-'98-'99.

Case of a man, the subject of marked arteriosclerosis, in whom x-rays readily revealed narrow bands running alongside and between the metacarpal bones, indicating the atheromatous arteries. The pulsation in living vessels will, of course, interfere with securing very good pictures; still, one may hope that, with perfection of technique, he will be enabled to diagnose arteriosclerosis of deeper structures—the aorta, for instance. Hoppe-Seyler (Münch. med. Woch.; N. Y. Med. Times, June, '97).

The main general diagnostic points are: increased arterial tension in association with hard arteries, hypertrophied

left ventricle, and accentuated second sound.

We are very apt to pass over the early cases even when they have the four cardinal symptoms—increased arterial tension, thickening of the vessel-wall, hypertrophy of the left ventricle, and accentuation of the aortic second sound. Again, in the later stages of the disease, when the secondary changes in the heart and kidney are developed, we are very likely to overlook the primary disease and call the case cardiac or renal as the case may be. In 25 cases, 24 men and 1 woman, most of the men being between 50 and 70, none in the thirties, most came for vertigo or headache. Twelve came primarily because of vertigo. These figures suggest rather an important point in diagnosis, namely: that a middle-aged or old man who complains of vertigo or constant headache is very possibly the subject of arteriosclerosis. J. L. Morse (Boston Med. and Surg. Jour., Dec. 10, '96).

Literature of '97-'98-'99.

Cases of vertigo in elderly persons associated with vascular degenerative changes are very far from uncommon. The cases may be divided into three classes:—

1. Simple vertigo. 2. Vertigo with epileptiform attacks. 3. Vertigo with a permanently slow pulse. These types, however, usually encroach upon one another. Simple vertigo may come on suddenly or be preceded by discomfort and buzzing in the head, and may even cause syncope. The attacks may be very frequent, or may be separated from one another by an interval of several days. The duration of each individual attack is very short, but it may terminate in death.

Vertigo with epileptiform attacks is less frequent, but should always suggest arteriosclerosis when it comes on in middle life. Occasionally these attacks also are fatal.

The vertigo with a slow pulse and attacks either syncopal or epileptiform differ from the others only in the slowness of the pulse.

The symptoms are due to implication

in the arteriosclerotic process of the lower vessels of the medulla, causing a less abundant and less regular supply of blood to the nerve-centres in that situation. Gourgon (Thèse de Paris, '97).

Grasset ('90), when speaking of chronic vertigo, recognizes certain forms, and the cardio-vascular form or the vertigo due to arteriosclerosis. Mendel ('95) looks upon vertigo as an early sign of arteriosclerosis, and recommends prolonged use of iodide of potassium and ergotine. Hutchings ('96) states that the prominent symptoms are diminution of the mental activity, vertigo, attacks of syncope, and disturbance of speech. P. T. Kovalevsky (Neurol. Centralb., No. 15, '98).

Etiology.—Arteriosclerosis is generally a disease of advanced life, but it is not infrequently found in middle-aged or even young subjects. Heredity probably plays an important part in the latter case. Males are affected more often than females. Alcohol, lead, rheumatism, gout, malaria, and syphilis are predisposing causes of this disease. Overwork of the muscles, overeating, and drinking to excess are considered by some as leading to sclerosis. Although nephritis may be caused by sclerotic vessels, it is also a means in producing this condition in some cases.

Negroes seem to be particularly susceptible to arteriosclerosis. Frank Billings (Inter. Med. Mag., May, '95).

Pathology.—Arteriosclerosis affects most often the aorta and coronary arteries, but may be found in almost any part of the arterial system, although it is rare in the hepatic, gastric, and mesenteric arteries. There are two varieties: the *circumscribed* and *diffuse*.

CIRCUMSCRIBED VARIETY.—In this form there first appear grayish swellings but slightly raised above the surface, the favorite places being in the arch of the aorta and at the origin of branches.

Soon fatty degeneration and necrosis occur and the patch becomes yellowish and soft, thus forming the atheromatous abscess which consists of fat-corpuses, cholesterin crystals, and granular *débris*. As a result of this softening the inner coat often gives way and allows this material to pass into the blood-current. In other cases, however, the atheromatous abscess may heal, leaving only a scar to mark its position, or it may become calcified.

The primary changes of this condition are to be found in the media and adventitia. They consist of local infiltrations around the vasa vasorum and form spots of lessened resistance in these two coats. The intima then becomes affected, and proliferative changes occur, which finally end in the formation of what is known as the atheromatous button. Thoma considers that this increased thickness of the inner coat occurs as a compensation for the growing weakness of the outer ones.

DIFFUSE VARIETY.—Most of the arterial system is affected by this form, which is often accompanied by the circumscribed variety in the aorta. The walls become thickened, this being due usually to the great increase in the intima. The media is often found to be hyaline or necrotic; calcareous deposits are also noted, especially in senile arteriosclerosis, and in some arteries there is almost complete disappearance of the muscle-fibres. Hypertrophy of the heart is common, and when the coronary arteries are affected myocarditis is also present. Although macroscopical changes in the kidney may be scarcely noticeable, microscopical examination reveals the sclerotic processes.

Regarding cardiac hypertrophy in arteriosclerosis, Hasenfeld (Deut. Archiv f. klin. Med., B. 59, '98) has recently shown that, even physiologically, the

splenic, hepatic, and superior mesenteric arteries have a small amount of connective tissue in the intima. Arteriosclerosis of mild or moderate degree, only microscopical, is quite common in the splanchnic arteries, but marked sclerotic changes are much less common than in the aorta, the arteries of the extremities, and the brain. Sclerosis is usually most marked on the main trunks of the splanchnics, and becomes less in the branches. Arteriosclerosis only leads to hypertrophy of the left ventricle when the splanchnics or the thoracic aorta are severely affected. Arteriosclerosis of the other vessels does not seem to have such an effect. In five cases of contracted kidney examined all the chambers of the heart were hypertrophied. If at the same time there was marked sclerosis of the splanchnics, the hypertrophy was most marked in the left ventricle. Extreme sclerosis of the aorta would probably have the same effect. Should further examinations confirm the results now given as regards the uniform hypertrophy of all parts of the heart, we must conclude that the cause of hypertrophy in contracted kidney increases the work of both sides of the heart and probably excites the heart to increased activity.

Literature of '97-'98-'99.

Arterial sclerosis limited to female organs. Case in which the vessels of the heart, the aorta, and other arteries where atheroma is so frequent showed but little trace of that condition. On the other hand, the ovarian and uterine arteries were calcified throughout nearly their entire length. The secondary branches in the broad ligament were tortuous and extensively calcified. The changes in the uterine walls were very marked, especially in the muscular tissue close to the serous coat, where arterial sclerosis was so advanced that masses of white spots, being collections of diseased arterioles, could be seen on

the cut surface of the muscular wall. The change extended inward as far as the endometrium. The whole uterus seemed as though it had been skillfully injected by an anatomist. Undoubtedly the changes were due to tubercle, which sets up hyperplastic inflammation of blood-vessels. Müllerheim (*Zeitsch. f. Geburts. u. Gynäk.*, vol. xxxvi, p. 2, '97).

Treatment.—A quiet, well-regulated life should be observed, excesses in eating, drinking, or of any kind are to be avoided, especially indulgence in alcohol. The skin should be kept in good condition by frequent bathing, and constipation and any urinary disorders should be promptly attended to. A syphilitic history calls for the use of the iodides. Potassium iodide in doses of from 10 to 20 grains three times daily over an extended period may also be given to advantage in most cases. The nitrites, especially nitroglycerin, are to be used for the high arterial tension. Gourçon advises that in later stages the iodide of sodium be given during twenty days of the month and that on the remaining days nitroglycerin be used. The latter remedy must be given in small quantities, however, not more than 1 minim of a 1-per-cent. solution at first.

Rumpf (*Berl. klin. Woch.*, '97), considering that in arteriosclerosis salts of lime are deposited in the altered wall of the vessel, recommends (1) to diminish the quantity of lime salts taken with food and (2) to try and decalcify the arteries. He therefore recommends a diet which does not contain milk. The diet should consist of meat, 250 grammes; potatoes, 100 grammes; bread, 100 grammes; fruit, 100 grammes; fish, 100 grammes; along with butter and sugar, and instead of fruit the patient may take vegetables. Besides the abstention from milk, the patient is not allowed to eat cheese, eggs, rice, or spinach. The diet

Rumpf recommends contains ten times less lime salts than milk diet. Distilled or boiled water only is allowed as beverage. To increase the elimination of lime salts Rumpf recommends lactic acid (*sodæ bicarbonatis*, 10 grammes; *acidi lactici*, q. s. ad saturat. aq. destill. 200 grammes). A similar effect may be produced by calomel, acetate of potash, oxalic acid, and many diuretics.

Regarding the use of baths and gymnastics in arteriosclerosis J. Groedel, of Bad-Nauheim, who has given special attention to the treatment of arteriosclerosis, contends that, although the increased blood-pressure, "considered as the usual consequence of treatment by the Nauheim baths, may, at first sight, seem to indicate that every patient with arteriosclerosis should be excluded from a treatment by baths, a further increase of the high blood-pressure usually found in arteriosclerosis must not only surcharge the heart more than is already the case, but also create the danger of the bursting of a cerebral aneurism, so often present in cases of arteriosclerosis." He has by numerous observations been able to convince himself that baths can be prescribed for these patients "in such a manner that the increase of blood-pressure does not take place, or only in a very slight degree." If the temperature be kept almost at the point of "indifference,"—that is, about 92° to 93° F. (33.2° to 33.8° C.),—the primary acute increase of blood-pressure caused by the contraction of the cutaneous vessels, and most to be feared, will be very slight, and if there be carbonic acid in the bath at the same time will quickly disappear. If the skin of the patient be cooled somewhat by moistening the parts particularly sensitive to cold before entering the bath, the avoidance of that primary increase of blood-pressure, or, indeed,

any shock whatever, will be the more certain. A similarly good effect is produced when the patient is only allowed to take half-baths and the exposed parts of the body are wrapped up so as to prevent cooling. In most cases the amount of water can be increased little by little at each bath until a full bath is at length attained, but even then it is advisable to let the patient only submerge his body by degrees. Placing cold bandages on the bather's head is often indicated. By proceeding cautiously in this manner he has never had an unfortunate case in the course of a practice of twenty-two years in Nauheim. Under what conditions can a course of baths be indicated or beneficial in cases of arteriosclerosis? It may be desirable to give baths for some other disease when arteriosclerosis is present. It is mostly a question of diseases based on the same etiological principle as arteriosclerosis itself, or such as usually lead to it. By combating these we can at the same time retard the progress of the sclerotic process in the vessels.

The influence of high altitudes for patients affected with arteriosclerosis is of great practical interest. Zangger, who recently (*Lancet*, June 19, '99) studied this question, states that if an altitude of from 4000 to 5000 feet above sea-level puts a certain amount of strain on a normal heart and by the rise of the blood-pressure indirectly also on the small peripheral arteries, this action must necessarily be multiplied in the case of a heart suffering from even an early stage of myocarditis or in the case of arteries with thickened or even calcified walls. It is especially the rapidity of the change from one altitude to another with differences of from 3000 to 4000 feet which must be considered. There is a call made on the contractility of the small arteries, on the one hand, and on the amount of

muscular force of the heart, on the other, and if the structures in question cannot respond to this call rupture of an artery or dilatation of the heart may ensue. Patients between the ages of 45 and 70 years who are the subjects of arteriosclerosis can often stand altitudes of 4000 feet and higher; this depends on the degree of the sclerotic process and especially on the localization, though patients in advanced stages all do better at altitudes of not over 3000 feet, and the reason is fairly simple. Take Engelberg, for instance, which corresponds with this height; it is obvious that the patient will want to go for walks and that not only on level paths. He will soon get to altitudes of from 4000 to 5000, even if warned to keep from climbing; if sent to a place already 4000 feet high he will take walks up to 5000 and 6000 and damage may ensue.

Patients with arteriosclerosis should not attempt a residence at a high altitude without medical advice. In any case the patient should take medical advice if symptoms show themselves, such as sleeplessness, dyspepsia, giddiness, buzzing in the ears, palpitation, paræsthesia, shortness of breath, or definite slight angina pectoris. Rapid ascents to a high altitude are very injurious to patients with arteriosclerosis, and the mountain railways up to 7000 feet and 10,000 feet are positively dangerous to an unsuspecting public, for many persons between the ages of 55 and 70 years consider themselves to be hale and healthy and are quite unconscious of having advanced arteriosclerosis and perchance contracted kidneys.

Bad results in the shape of heart-collapse, angina, cardiac asthma, and last, not least, apoplexy, often occur only on the return to the lowlands; patients with cirrhotic kidneys are in the greatest

danger. In the case of apoplexy it is generally the combined influence of a few things, slight in themselves, which, added to the detrimental effect of the high altitude, produce the fatal result. Overexertion immediately after reaching the Alpine resort, overfeeding, an unusual amount of alcohol, exposure to a hot sun, and sometimes constipation neglected for a few days play their part.

Patients suffering from arteriosclerosis at whatever altitude they may be should be kept on an almost vegetarian diet with sufficient mineral water, such as Vichy, Passugg, or Seltzer. They should be restricted in respect of alcohol and strong tea or coffee, and, above all, their walks on hot days must be limited to the hours between 8 and 10 A.M. and from 4 to 7 P.M.

Arteritis.

Definition.—Arteritis is the inflammation of an artery. When affecting the inner coat it is called *endarteritis*; when the middle coat, *mesarteritis*; and when the external coat, *periarteritis*. Arteritis occurs as a normal process during repair of an injured artery, but the term arteritis as here understood is applied to inflammation of an artery due to local bacterial infection.

Symptoms.—Arteritis is often due to neighboring inflammatory processes, the infecting micro-organisms being carried to the vascular vulnerable spot through the connecting blood or lymphatic channels; the disease may then start with the inner coat. On the other hand, the infection may occur at the surface through contamination from a septic wound carelessly dressed. The inflammation then attacks the adventitia and proceeds to the inner coats. The presence of a thrombus brought from a distant purulent process by the current may not only compromise the lumen of the vessel, but

by supplying pyogenic micro-organisms, lead to sloughing and perforation of all the coats. If the three coats yield, hæmorrhage follows; if the internal coats alone soften and yield, an aneurism is formed. The symptoms of arteritis may thus assume aspects varying with the causative factors of the inflammatory process. In some cases repair occurs and the vessel regains its normal condition, in others the reparative effort ends in the elaboration of a fibrous cord, composed of the transformed artery-coats.

The active symptoms of arteritis are, on the whole, about similar, whatever be the cause of the trouble, and they are marked according to the degree of stenosis present. There is pain over the course of the vessel, tenderness on pressure, and usually some loss of power in the muscles of the affected region. If the artery is superficial, it can be felt as a tense, cord-like structure. Pulsation may or may not be present. When the collateral circulation is not formed sufficiently early there is danger of gangrene.

When hæmorrhage occurs from a large artery, the life of the patient may be endangered. When infectious thrombo-arteritis occurs, metastatic abscesses may appear in various parts of the system.

Pathology.—Pathological inflammation of a blood-vessel is always due either to some poison or infection. According to Thérèse (Rev. de Méd., Sept. 10, '98), it is necessarily attended with disturbance of the whole organism. Vessels of calibre sufficiently large to have vasa vasorum in their walls react somewhat differently from those of smaller calibre, since obliteration of the minute vascular vessels may take place without the formation of thrombi. This occurs through the proliferation of the connective tissue and subsequent contraction. In cases of infection a cellular exudate often occurs

in the perivascular lymphatic spaces, in consequence of the absorption of the toxic products by the lymph-channels, and it is probably the primary cause of the vascular lesions. Recent investigations indicate also the occurrence of changes in the veins. The nervous system also may have some influence by causing alternate constriction and dilatation of the small vessels, thus giving rise to a condition favorable to escape of the leucocytes.

Treatment.—Absolute rest is indicated together with warmth of the part in order to prevent gangrene. Some form of opium may be given to relieve the pain, and nourishing food and tonics are of the greatest importance in the maintenance of the patient's general health and strength. Mercurial ointment reduced in strength by the addition of vaselin or lard, according to the age of the patient, greatly assists the reparative process, if applied gently with a woolen pledget along the course of the inflamed artery. Chloride of ammonium, 5 grains every three hours, tends to encourage the dissolution of any thrombus that may be present.

Veins, Disorders of.

Phlebitis.

Inflammation of a vein, as here understood, also involves the direct entrance of bacteria into the vessel or by extension from a neighboring suppurative process.

Phlebitis may, however, be acute and subacute.

Acute phlebitis is usually the result of some injury accompanied by infection. It sometimes assumes, under the influence of septic traumatism, very grave proportions, leading to pyæmia. The *subacute* form is less grave, and is usually caused by some disease of the vascular coats accompanied by thickening, the ac-

cumulation of fibrous tissue leading to narrowing of the vascular lumen.

Symptoms.—When the vein is superficial, inspection shows a dull-red line, which corresponds to the course of the vessel. Discoloration of the skin and œdema are noticeable below the seat of obstruction. Upon palpation great tenderness is elicited, the vein is felt as a hard, knotty cord; œdema is often noted. There is pain and stiffness in the limb affected, these being especially noticeable upon movement.

In phlebitis of the deeper veins the only symptoms often consist in deep-seated pain and tumefaction. Constitutional symptoms are seldom serious unless there is pyæmia, when fever attended by rigors and joint-pains may be present: an indication that general infection is beginning. The tongue is usually dry and coated.

When in the subacute form thickening of the vein occurs, leading to occlusion of the vein, an abscess may form. But unlike arteritis, there is no hæmorrhage, the vessel being collapsed by the newly-formed fibrinous matter and the pressure of the surrounding inflammatory infiltration. Acute phlebitis may be developed, however, through rupture of the abscess and introduction of micro-organisms and their products into the vein. Pyæmia may thus also ensue in the subacute form, but through the development of acute phlebitis as a complication.

Etiology and Pathology.—Phlebitis may be caused by varicose veins, syphilis, gout, traumatism, or the absorption of septic material.

The two outer coats are especially involved, and become hyperæmic and infiltrated with serum or pus. The inner coat is cloudy and fissured, and its disintegration may be followed by the dis-

semination of small masses of *dehritus* into the blood-stream. During the inflammatory process a clot forms, which may finally convert the vein into an impervious cord; it may contract so as to occupy only a portion of the lumen, thus allowing the blood to flow past it. Occasionally the morbid vascular tissues disappear entirely by absorption. In some cases a portion of the clot becomes broken off and is carried away into the general circulation, where it may cause a fatal issue by occluding an important vessel. If it is infected with septic material, pyæmia may result.

Prognosis.—When phlebitis occurs in the course of any severe constitutional disease, especially in pyæmia, the prognosis is very grave, but a simple phlebitis seldom results fatally.

Treatment.—Absolute rest with elevation of the affected limb is to be insisted upon. A wash of lead and opium, mercury and belladonna ointment, or hot fomentations should be applied to the part. Leeches along the course of the vein often prove of value. If abscesses form, they are to be incised. It is important that the diet be easily digestible and nourishing, that the bowels be kept open, and that the general health be maintained at as high a level as possible. When the inflammation has entirely subsided, gentle massage toward the heart may be of advantage in restoring the sluggish circulation of the part. When abscesses appear, they should be opened under strict antiseptic precautions, to avoid migration of pyogenic bacteria and their toxins into the general system. Unless this is resorted to, the micro-organisms and their toxic products also tend to disintegrate the thrombus, and thus to favor their being transported elsewhere, with the results already mentioned.

Literature of '97-'98-'99.

Electricity exceedingly satisfactory. The treatment should be begun in the acute or subacute stage unless the case is suppurative. The continuous current should be used; the dose given should be accurately measured in every instance, and never exceed 5 milliampères in the early stages, being gradually increased, if necessary, up to 20 milliampères. Violent muscular contractions especially should be avoided. Margaret A. Cleaves (Med. Rec., Mar. 18, '99).

Varix, or Varicose Veins.

Definition.—A dilated and thickened condition of the veins, especially the internal saphena, which becomes prominent above the surface, knotty, and tortuous.

Symptoms.—When the varices are superficial they may be seen as enlarged and tortuous, bluish, tumor-like masses. A dull pain is often present, and there is some loss of power and a feeling of weight in the part. Thrombosis and phlebitis are also frequent accompaniments of this condition.

The superficial veins are usually those mainly affected, the circulation being maintained by the deeper vessels. They often extend to the scrotum; occasionally, the large superficial veins of the abdomen are all involved, a thick, bluish, entangled, arborescent mass of vessels projecting from the surface. In some cases the deeper veins are the first affected.

Infiltration of the surrounding tissues is frequent, but this differs from œdema in that it does not pit under slight pressure. An eczematous eruption often appears in the tissues so affected, which degenerates into an ulcer: the so-called "leg-ulcer," or varicose ulcer. When this complication involves a large varicose vein, dangerous hæmorrhage may ensue. Deep varices are difficult of diagnosis.

According to Gay, muscular cramps are indicative of this condition.

Etiology.—Varicose veins are caused by an abnormal amount of blood being forced into the veins or by some impediment to its return-flow. The female sex is more often affected than the male. Heredity, a lowered state of health, occupations which require much standing, tight garters, heart and lung diseases, and tumors of the pelvic or abdominal cavity may all be determining factors in the disease.

Pathology.—The veins are lengthened and are sometimes so tortuous that it is difficult to trace the lumen. The greatest dilatation is always situated just above the valves. The latter are often destroyed or are rendered incompetent on account of the dilatation of the vein. The walls are generally very much thinned, but they may be thickened, or fibroid degeneration may occur. When there has been a fibroid periphlebitis the veins become adherent to the surrounding tissues. Their outer coat sometimes becomes extremely thin and allows the internal coat to protrude in more or less lobulated masses. At times rupture occurs, as stated. Thrombi may form in the veins, which may give rise to suppurative phlebitis; at times these thrombi undergo transformation into laminated or hard masses called "vein-stones," or "phleboliths."

Treatment.—Palliative or radical measures may be used in the treatment of varicose veins. The former include treating the cause, building up the general health, attention to the bowels, and rest in bed, with elevation of the affected limb. Elastic stockings or bandages are of value for the support they give to the veins, and they should be applied and removed with the patient in the recumbent position. Hæmorrhage may be con-

trolled by elevation of the limb and compression.

The radical treatment consists of some operation for obliteration of a portion of the vein. The operations most commonly in use and of most value are ligation, either upon exposure of the vessel or subcutaneously; acupressure, and excision of the vein. In subcutaneous ligation a needle armed with catgut is passed through the skin on one side of the vein, beneath the vein and out through the skin on the opposite side. The needle is then reinserted at the exact point of exit, is passed over the vein, care being taken not to enter it, and is made to emerge at the original puncture. By tightly drawing together the catgut and tying its ends the vessel is occluded at that point. Numerous ligations are necessary and it is always better to apply the one nearest the heart first. Phelps uses from thirty to forty ligatures, with good results.

An effective method is that recommended by Trendelenburg. This procedure is based on the fact, established chiefly by this observer's investigations, that the primary cause of the varix is insufficiency of the valves of the veins, whereby the weight of the blood-column in the saphena is thrown on the peripheral vessels. It consists in ligating the saphena in the upper part of the thigh. G. Perthes reported 41 cases thus treated, of which 32 were permanently cured. Relapse having been traced in several cases to renewed permeability of the ligatured vein, the rule now is, instead of simply tying the saphena, to excise a short portion. The results of ligation of the saphena in the thigh, according to Ledderhose (*Centralb. f. Chir.*, Aug. 20, '98), may prove disappointing where collateral veins from the external saphena and from the deep veins open

into the main trunk above the point of ligature, or where the internal saphena is duplicated and only one of them is tied; it is recommended, therefore, to investigate very thoroughly the anatomical arrangement of the veins in each individual case before operation, and to apply the ligature high up near the saphenous opening. If the epigastric and pudendal veins open into the internal saphenous trunk, they should also be ligated.

By multiple peripheral ligature or excision of the veins, the general cause of the dilatation is not affected and recurrences are frequent. Trendelenburg's method a distinct advance; ligature of the internal saphenous vein, into which all the peripheral veins empty. Rebellious varicose ulcers quickly yield. Winwarter (*Annales de la Soc. Medico-Chir.*, Nov., '94).

Twenty-five cases treated; eleven seen at the end of six months. All showed disappearance of pain and discomfort. Cure maintained for two years in two cases, from one to two years in seven, and less than a year in three; but in only two cases had the varices entirely disappeared. Faisst (*Beiträge z. klin. Chir.*, B. 12, H. 1, '95).

"Garter" incision. Circular incision through skin and areolar tissue down to deep fascia, across all subcutaneous vessels. Ligature above and below of cut ends of these vessels effectually prevents return-flow of blood through superficial channels. All venous circulation driven into deep veins beneath deep fascia, where channels better supported. D. M. Moir (*Indian Med. Reporter*, Dec. 16, '95).

Literature of '97-'98-'99.

A simple and successful method of operating on varicose veins of the leg: The leg is first washed, shaved, and carbolized. Then the saphena is exposed as high as possible in the thigh, preferably at the saphenic opening, as recommended by Trendelenburg, by incision of about two inches long. The vein is then caught above and below by two ordinary

serrated Wells forceps, and a piece cut out between them. A sponge is then placed in the wound and the vein is similarly treated lower down in three or four places—*i.e.*, wherever markedly varicose. When all the wounds have been dried, and all bleeding stopped with catch-forceps, the latter are removed one by one, and an ordinary white gauze bandage, which has been steeping in 1-to-20 carbolic lotion for forty-eight hours, is applied to the limb in the usual way well below the lowest wound, and is wound round until it is about to cross the lowest wound. The edges of the latter are held together with the left thumb and first finger, and the bandage is carried across them. When the fingers are removed the edges will be seen through the transparent bandage to be coapted very accurately. If this is not the case at one spot or another, a probe slipped under the bandage, through which the edges can be still well seen, will easily adjust the edges, while the gauze is held taut. Then the bandage is carried up the limb, each wound being similarly treated. Over the gauze the author usually lays a strip of salicylic wool, and retains it with firm turns of an ordinary bandage to keep steady, elastic pressure. This dressing is left on until the tenth day, when the wounds will be found to be closed by a linear scar as accurately as if they had been stitched, and only require a little wool and collodion for a few days longer.

The advantages of this method—which is only an application of that which Credé, of Dresden, applies to amputation wounds—are its simplicity, its rapidity, and that the patient has no removal of stitches to look forward to. There is also the advantage that no ligature is left in the wound. Such ligatures occasionally, though rarely, give rise to pain for weeks.

The only point to be specially attended to is the arrest of hæmorrhage from collateral vein branches as well as from the main trunk, and even pressure. A. E. Barker (*Clin. Jour.*, June 16, '97).

When there are large masses of veins on the limb, not affecting the saphenous vein above the knee. Schede's method,

which consists in making a circular incision about two inches below the knee, separating all the veins as they present themselves, and ligaturing them with catgut, is advised. The circular cut is then sutured.

After these operations the ulcers acquire a more healthy appearance, and begin to heal. Laplace (*Ther. Gaz.*, Sept., '98).

In acupressure harelip-pins are passed through the skin and beneath the vein at distances of about one inch apart. An elastic band or a figure-of-eight ligature is then applied over the ends of each pin. These pins may be removed at the end of eight days. H. Lee has modified this operation somewhat by dividing the vessel subcutaneously between the pins, which then need remain only for four days.

Varicose ulcers often yield to mere physical support. If the ulcer is kept very clean and dusted with dermatol night and morning and a rubber bandage is carefully wrapped around the limb from the ankle to the knee, it often becomes smaller and finally disappears. The bandage is only worn during the day.

Ulcers of the legs may be treated in the following manner: After the leg has been washed with hot water or with feebly carbolized water, it is dried by the application of sterilized absorbent cotton, and then painted with tincture of aloes. If the ulcer is superficial, it is only necessary to pass the brush over once or twice; but if it is deeper, a thorough application of three or four coats of the tincture should be resorted to, the patient resting until the application is dry. This application is made for several consecutive nights; it is apt to cause very considerable pain, which rapidly disappears.

The dressing after each application should be covered with rubber dam. After recovery, a flannel bandage should be employed. Coffin (*Jour. des Prat.*, Mar. 21, '96).

Literature of '97-'98-'99.

Europhen is a satisfactory substitute for iodoform, at least so far as ulcers of the leg are concerned. It may be employed in two forms—mixed with an equal amount of very finely powdered boric acid as a dusting-powder, and in the shape of an ointment made by dissolving 3 parts of europhen in 50 of vaselin over a water-bath and adding 50 of lanolin. This ointment may be increased in strength to that of 5 or even 10 per cent. of europhen, especially in cases of torpid ulcers which show no tendency to heal. L. Nied (*Wiener klin. Rund.*, Apr. 4, '97).

Ulcers of the leg are personally treated by exposing them to heat. The flame of a Bunsen burner is made to impinge on a square plate of metal that will stand heating, so as to bring it to a dull-red heat, and the ulcer is exposed to the action of the heat at a distance of about ten inches, the rest of the limb being protected with bandages. The temperature at the ulcer is about 113° F., which is easily borne, and the flame is so regulated as to maintain this temperature during the whole exposure, from twenty minutes to an hour. The surface is then found to be glazed over, and large, granulations are to be seen through the semi-transparent coating. The ulcer is then left exposed to the air for some time, and when it is dressed care should be taken that its surface is not touched by the aseptic gauze or other material used. Improvement is generally experienced even after the first sitting, and cicatrization is completed in from five to twenty-five applications. In the later sittings, when the ulcer is nearly healed, a more moderate heat may be employed. Colleville (*Lancet*, May 29, '97).

In treatment of chronic ulcer of the leg the first step is thorough antiseptics of the wound and surrounding skin; procured by first washing the entire leg with soap and water and carefully drying it. Then the area of the wound is covered with calomel, which is converted into a thick paste by mixing it with water. Over this paste salt is strewn and thoroughly mixed in. A gauze and

cotton dressing, is then applied. The action of the salt upon the calomel produces sublimate. This nascent sublimate is very active, and for three or four hours produces an intense burning, which gradually subsides.

After twenty-four hours the wound is dressed, and a dry wound free from unhealthy granulations is found, which is perfectly aseptic.

The application of unguentum basilicum, with rest in bed, produces a speedy covering of the wound with new skin. Exuberant granulations are touched with crystals of copper sulphate. If there is an area which refuses to heal toward the end of the treatment, a healing ointment is applied to a sterile piece of cardboard, it being held firmly in place with a compressive cotton dressing and bandage. After complete cicatrization the whole lower leg, including the foot, is placed in a fixed dressing for two weeks. The resulting skin is very firm, and does not have the tendency to break down. V. Langsdorf (Cent. f. Chir., Nov. 20, '97).

The treatment of chronic non-specific leg-ulcers of moderate size by strapping is regarded as superior to other usual methods. Strapping of ordinary adhesive plaster spread on stout, pliable holland, supplied in 12-yard rolls, 16 inches wide, is cut into various lengths, according to size of each leg, each length being about $1\frac{1}{4}$ inches wide, and applied so that the strips overlap by $\frac{1}{8}$ inch. The foot should be included in the strapping, commencing at the base of the toes and carrying the strapping up the leg to 3 inches or 4 inches above the ulcer, which is completely covered in. A strong calico bandage should be applied over all, from the toes to the knees. Zinc ointment may be applied to excoriations, the lint not being too close to the ulcer, and dressing changed twice a week. On the average, 12 strappings are needed. After healing of the ulcer, Martin's bandage or an elastic stocking should be worn. Charles Herbert Thompson (Lancet, Aug. 27, '98).

Antinosin successfully used in a series of fifteen cases of chronic ulcers treated at the St. Louis City Hospital. The ulcers were dressed daily at first, and

then every second day. In each case the adjacent parts were thoroughly washed in a 1 to 1000 bichloride solution, after which the ulcer was carefully dried. The powdered antinosin was then lightly dusted over the entire affected surface. Over this was placed a gauze dressing, held in place by a roller bandage applied loosely. In cases which presented a hard, infiltrated border at the edge of the ulcer there was first a thorough curetting, which was occasionally repeated while the case was under treatment. In all cases improvement was noted from the beginning. In some cases complicated by varicose veins it was noted that they decreased in size corresponding to the improvement of the ulcer. A. H. Ohmann-Dumesnil (St. Louis Med. and Surg. Jour., Mar., '99).

In the treatment of chronic leg-ulcer the leg and ulcer should first be scrubbed with soap and water, then curetted. This may be rendered painless by injection of a solution of cocaine in the vicinity of the ulcer. After curetting, the ulcer is brushed with pure carbolic acid and then touched with cotton dipped in alcohol; and a bandage is applied, beginning at the toes and extending as far as the knee. When the ulcer becomes perfectly dry, adhesive stripping is made use of. The heart, lungs, and kidneys should be carefully examined to determine if congestion and œdema of the lower extremities is due to disease of these organs. Corsiglia (N. Y. Med. Jour., Mar. 25, '99).

Injuries of the Blood-vessels.

Hæmorrhage.—When a blood-vessel is injured, hæmorrhage usually follows unless the vessel has been completely torn across and twisted so that the inner coats curl up and occlude the lumen.

Hæmorrhage may be *arterial*, when the blood comes in jets synchronous with the heart's beat, and is bright red—except in the absence of oxygen as in asphyxiation; or it may be *venous*, when the blood flows in a continuous stream, is dark in color; and *capillary*, i.e., characterized by an oozing from the tissues,

and which, as a rule, stops upon exposure to air.

Hæmorrhage may also be divided into *primary*, when it occurs at the time of the injury, *recurrent*, or *intermediary*, when it follows within twenty-four hours and during the period of reaction; or *secondary* when it occurs any time after twenty-four hours until the wound is healed.

PRIMARY HÆMORRHAGE.—A slight hæmorrhage of any kind is usually recovered from promptly unless the patient's general health is impaired. The almost universal practice of bleeding as a therapeutic measure during the early part of this century showed how even copious bleeding could be benign in immediate results. After severe bleeding the patient's color is lost, the surface becoming pale and the lips white, the extremities are cold, the heart's action is weak, the pulse feeble and rapid, the respiration frequent and at times sighing. A feeling of faintness is experienced, together with loss of voice and buzzing in the ears. Often the body becomes covered with a profuse cold perspiration, while there may be delirium, collapse, and even death.

Following the hæmorrhage the patient is very weak, the muscles are flabby and soft, the pulse is rapid and easily disturbed, and there is often a slight rise of temperature.

TREATMENT.—The treatment of hæmorrhage may be both constitutional and local. It is important to keep the patient in the recumbent position with the head on a level with or lower than the body, unless the bleeding be from the nose or ears, when the upright position will often cause it to cease. All clothes are to be loosened and the normal temperature is to be sustained by means of warm blankets and hot-water bottles,

care being taken in the use of the latter that they are not hot enough to burn the patient. When the bleeding vessel has not or cannot be secured, heart-stimulants should be very carefully given if they are given at all. If, however, the vessel has been secured, strychnine, nitroglycerin, digitalis, ammonium carbonate, or hypodermic injections of ether or brandy are of great value. Rectal, subcutaneous, or intravenous injections of a warm normal saline solution (1 teaspoonful of sodium chloride to the pint of water) are often of advantage in filling the empty blood-vessels, and thus giving the heart something to work upon. Transfusion of blood may also be used.

Injuries and Wounds of Arteries.

CONTUSION.—An artery may be contused and not give rise to any special symptom, but if badly injured its walls are apt to slough and cause hæmorrhage. Aneurism or obliteration of the artery may also result from this injury, and when the latter occurs in some large or important vessel gangrene of the parts supplied by it may follow. (See **ANEURISM**, volume i.)

RUPTURE.—This may be either incomplete or complete. When incomplete the external coat is preserved, the middle and internal being torn. The latter, by curling up, may form the starting-point of a thrombus, thus causing the lumen of the artery to become occluded. In other cases the accident may be followed by an aneurism, or by hæmorrhage the result of an erosion of the outer wall of the vessel.

In complete rupture or laceration, if there is an external wound, hæmorrhage is often severe, but it may be scarcely noticeable, provided the inner coats have been able to act as a barrier. If there is no external wound the tissues become

infiltrated with blood or a traumatic aneurism results.

PUNCTURED WOUNDS.—A punctured wound is caused by some thin sharp or blunt instrument: a needle, the blade of a knife, etc. It may give no trouble if the wound is small; but, when large, hæmorrhage may be considerable. This kind of a wound is very apt to be followed by a traumatic aneurism. (See ANEURISM, volume i.)

INCISED WOUNDS.—An incised wound may be longitudinal, oblique, or transverse, and is caused by some cutting instrument. When transverse, bleeding is often profuse, and this may also happen with the longitudinal cut if the artery is relaxed, as in the anterior aspect of the elbow—when the arm is flexed. Otherwise in this and in oblique wounds hæmorrhage is not great.

GUNSHOT WOUNDS.—In a gunshot wound the bullet may cause merely a contusion, it may cut the artery completely across, giving rise to considerable hæmorrhage, or, if it injures the neighboring vein also, an aneurismal varix may result. This subject has been considered in the various departments in which wounds and injuries have been described. (See ABDOMEN, INJURIES OF, volume i, etc.)

Treatment.—Besides the constitutional treatment already referred to, cold in the form of ice, or heat in the form of hot water of about 120° F., locally applied, often causes arrest of hæmorrhage. Heat is to be preferred, however, as it has no depressing action upon the patient.

Pressure, which is often of value, may be applied by means of the finger, by compresses secured by bandages to the bleeding-point or over the main artery, or by a compress placed in the flexure of a joint held *in situ* with a bandage.

The latter methods must be carefully watched, as the venous return is interfered with and œdema of the part may arise. Care must also be taken not to bandage so tightly as to cause gangrene. If the actual cautery is used, it must be a very dull red, otherwise it burns away the tissues, and bleeding returns when it is removed. Styptics should seldom or never be used.

In many cases acupressure is of great value. A harelip-pin or needle is passed through the skin perpendicular to the artery, then under the latter and out through the skin on the opposite side, when a figure-of-eight ligature is thrown around the ends of the pin. Another method consists in introducing the pin or needle through the skin parallel to the artery, then rotating it until perpendicular to the artery, when it is carried across and in front of the latter, to be deeply inserted into the tissues of the opposite side.

When torsion is used in the treatment of hæmorrhage, it is accomplished by catching the end of the cut artery with a pair of forceps and twisting it two or three times until there is no sense of resistance. Care must be exercised not to twist the end off. This method is applicable only when the vessel is entirely cut across.

Ligation is one of the best methods of controlling hæmorrhage from an artery. Silk or catgut ligatures are to be preferred and must be aseptic or antiseptic. If the hæmorrhage is primary and bleeding has ceased, no ligature is needed. When, however, the vessel is still bleeding the surgeon should search for it in the wound and when found should apply a ligature to both ends if the artery is cut entirely across and to both sides of the wound when the vessel is only partially severed. If the distal end cannot

be found, the proximal end is to be tied and a compress placed over the wound. In some cases it is impossible to tie the bleeding vessel in the wound and ligation in continuity must be resorted to.

SECONDARY HÆMORRHAGE. — When secondary hæmorrhage occurs from a stump, pressure and elevation may arrest it and should be tried before resorting to other measures. If it cannot be stopped by these means, the wound is to be opened up again—provided the union is not far advanced and the cavity seems to be filled with clots—and the bleeding vessel caught and ligated. If, however, the wound is nearly healed and there do not seem to be many clots, the hæmorrhage is to be controlled by securing the artery, of which the bleeding vessel is a branch, just above the stump, and either applying acupressure or cutting down and ligating it. If hæmorrhage still persists, the main artery may have to be ligated in continuity or even amputation may have to be performed.

When secondary hæmorrhage occurs from an artery which has been tied in continuity, pressure should first be applied by means of graduated compresses to the bleeding-point. In some arteries near the trunk this is the only means by which one may hope to stop the hæmorrhage, but in others, where bleeding still persists, the wound is to be opened, the vessel secured, and a ligature applied above and below the source of hæmorrhage. When, however, the vessel cannot be found or hæmorrhage recurs after ligation, the main artery must be tied, or amputation performed, especially if it is the lower extremity that is involved.

Injuries of Veins.

Injuries and wounds of veins are not, as a rule, followed by as serious results as in the case of arteries.

Hæmorrhage from a vein is dark in

color, and may be stopped by pressure upon the distal side of the wounded vessel, thus distinguishing it from arterial bleeding, which cannot be thus controlled.

Hæmorrhage from the smaller veins usually ceases of itself, while pressure on the distal side is of value in those somewhat larger. When the large veins are injured, however, ligatures should be applied. Phlebitis and gangrene very seldom follow. When the wound is only on one side of a large vein it is often possible to lift the wall on either side of the wound with forceps and apply a ligature.

Entrance of Air into Veins.

Symptoms.—At the point when the air enters the vein there may often be heard a peculiar hissing or gurgling sound, and frothy bubbles appear in the wound. The patient suddenly becomes pale and is partially collapsed. The heart-beat is irregular, the pulse feeble, and respiration difficult and gasping. Death sometimes follows immediately or may be deferred a number of hours. In cases in which only a small amount of air is introduced recovery may occur.

Etiology.—Operations in the vicinity of the large veins at the root of the neck and in the axillary space are especially liable to this accident.

Treatment. — Prophylaxis consists in using the handle of the scalpel to separate the fascia in operations about the large veins and in first ligating any vein that may need to be divided.

When the accident has occurred, the wound is to be immediately filled with water, the vein is to be compressed and a ligature applied as soon as possible. The head of the patient should be lowered, and mouth-to-mouth insufflation or other methods of artificial respiration practiced. Cardiac stimulants, as digitalis or brandy, hypodermically, are in-

dicated, and inhalations of oxygen-gas are often of value.

Vascular Obstruction.

Thrombosis.—A *thrombus* is a clot of blood which forms in the heart, blood-vessels, or the lymphatics during life. Thrombosis is the process of forming such a clot.

Thrombosis may occur in the heart, the arteries, the capillaries, the veins, and in the lymphatic vessels. The coagulum, or thrombus, consists of fibrin inclosing within its meshes a larger or smaller number of blood-globules, which, in rapidly-formed thrombi, are both red and white, producing the dark color of such thrombi when first formed. In thrombi which are of slower and gradual formation, and in those due to projections from the interior of the vessels, the red cells may be absent and the thrombus be colorless or yellowish white. The white cells are present in much larger proportion than in normal blood.

Varieties.—A thrombus occupying the position where coagulation began is called a *primitive* thrombus; when it gradually extends from this point along the vessel, an *extension* or *produced* thrombus. A *laminated* thrombus results from a process of continuous coagulation; a *non-laminated*, or *uniform*, thrombus from an intermittent coagulation. When a thrombus adheres to some part of the vessel-wall it is called a *lateral*, or *parietal*, thrombus; when it completely fills the vessel, an *obstructing*, or *obliterating*, thrombus; after a thrombus is formed it may undergo certain changes by which spaces are left in it, giving it a spongy consistency and allowing the blood to flow through it, producing what is termed a *canalized* thrombus.

Finally, a thrombus may be *venous*, *arterial*, *cardiac*, *capillary*, or *lymphatic*

according to the vessel in which thrombosis takes place, the most frequent seat of the latter being in the veins, where the circulation is naturally feeble.

Symptoms.—The symptoms of this process are those of arrested circulation. They differ according to the vessel affected. If a main venous trunk be obstructed and a compensatory collateral circulation cannot be rapidly established, there are produced passive hyperæmia, venous dilatation, serous transudation, and occasionally hæmorrhage in the vicinity of the occluded vein, with dilatation of the collateral channels. Moist gangrene may result in extreme cases. According to the location of the vein affected we may have hydrothorax, ascites, or anasarca of an extremity; hæmorrhage from the stomach, intestine, or kidney; cyanosis and œdema of the face and neck, etc. The symptoms of arterial thrombosis are mainly those of arterial embolism.

Diagnosis.—The diagnosis is usually easy if close attention to the history of the case and the symptoms be observed. Differentiation of thrombi and post-mortem coagula may be made if the fact is borne in mind that a post-mortem coagulum never completely fills the vessel, as after the clot has shrunk there is no further supply of blood to fill up the space between the latter and the vessel-wall; post-mortem coagula are never laminated, are looser in texture and moister, do not adhere so closely to the wall of the vessel, and, though they may be either colored or colorless, they never exhibit the appearances due to the changes which normally take place in thrombi.

Etiology.—Thrombosis may be due to certain alterations in the lining membrane of the vessels, producing an obstruction or roughening, and to retarda-

tion or arrest of the circulation; the presence of foreign bodies and of the microzymes of septic processes may be considered as having a causal relation to this process. Hyperinosis, or abnormal increase in the fibrin factors of the blood, and diminished fluidity, as in cholera, may be regarded as predisposing causes which may become active in conjunction with a retardation of the circulation. Of all these causes, retardation of the circulation is the most important.

The principal causes of *venous* thrombosis are two. The first cause is injuries of veins where Nature's method of arresting hæmorrhage is the formation of thrombi. The thrombus may extend along the vein, causing blocking of venous trunks at a distance from the original site of the injury, as is seen after parturition, where thrombosis of the uterine sinuses may extend to the iliac and femoral veins. The second cause is inflammation of the layers of the vein, by altering the condition of the lining membrane; in many cases of phlebitis, however, the thrombosis is the primary lesion, the inflammation of the layers of the vein being secondary. Other causes of venous thrombosis are pressure upon the veins; dilatation; arrest of the circulation in the capillary district of the vein, from embolism or inflammatory stasis. Finally, weakened heart-action, as in marasmus and other exhausting diseases, may cause sufficient retardation of the circulation to induce venous thrombosis; these latter are mostly met with in the veins of the lower extremity and the pelvis, less frequently in the sinuses of the dura mater.

Arterial thrombosis may be caused by wounds and injuries, by degeneration of the lining membrane of the arteries, by aneurisms (by stagnation coagulation), and any condition, as embolism, that produces arrest of the circulation.

Cardiac thrombosis may be caused by endocarditis, imperfect emptying of the cavities and consequent stagnation due either to valvular stenosis or lack of tone in the heart-muscle.

Capillary thrombosis may be caused by an extension from the veins and arteries, or it may be primary.

Lymphatic thrombosis is chiefly due to alteration in the constitution of the lymph whereby it acquires the property of more ready and perfect coagulation, normal lymph being only slightly coagulable. This form is mostly observed during the puerperium, in the uterine lymphatics and their continuations to the lumbar glands, and more rarely in the thoracic duct.

PATHOLOGY. — The first change in a thrombus is a shrinking process, during which it becomes denser. Decolorization follows, and it becomes tougher, denser, or even somewhat friable. The subsequent changes vary much.

The thrombus may continue to shrink and dry up until it becomes tough and leathery or even calcified (phleboliths).

Softening may take place either as a result of molecular disintegration or more rarely of suppuration. In the former case the thrombus liquefies, forming a milky fluid consisting of an oily and granular *detritus*, the softening beginning in the centre.

Suppuration occurs occasionally in venous thrombi surrounded by, or leading from, inflamed parts, the number of leucocytes in the thrombus becoming increased either by proliferation or immigration and the whole melting down into a purulent fluid. The wall of the vein, in these cases, is itself always inflamed, and these softened and broken-down thrombi are a common cause of embolism.

Finally, the thrombus may become organized, new tissue growing into it from

the vessel-walls and forming a vascular reticulated connective tissue, in the meshes of which are found the remnants of the red blood-globules and fibrin of the clot. Progressive dilatation of the newly-formed vessels gradually renders the thrombus cavernous (canalized thrombus), and finally, by their coalescence, the clot finally disappears and the vessel again becomes pervious.

Literature of '97-'98-'99.

The following are results of a study of the changes observed in the process of clotting of the blood within the vessels during life. Organization of the intravascular blood-clot is made at the expense of the endothelial cells lining the lumen, both in veins and arteries, the fibrinous net-work of the clot serving only as a scaffolding or support for their development. The phenomena of organization are very rapid. On the first day there is a modification of the endothelial cells. Capillaries appear about the third or fourth day, and connective tissue about the ninth or tenth. Infection of the blood-clot delays both the extent and rapidity of the process of organization, though a certain degree of traumatism may favor them. The phenomena of organization are everywhere the same. It is always the lining endothelium which starts the process, and it is most perfectly seen in the connective tissues. Cornil (*Gaz. des Hôp.*, Aug. 28, '97).

Treatment.—The treatment of thrombosis varies according to the seat of the process, and is mainly prophylactic. Great care should be taken that the thrombus does not give rise to emboli. It is necessary, therefore, to keep the part at rest until organization or absorption of the thrombus has taken place.

Literature of '97-'98-'99.

As a preventive of thrombosis in the veins of the lower extremity after abdominal operations, raising the foot of the bed after all operations within, or in

the region of, the abdomen has been personally performed, and thrombosis has not been observed except in one case, in whom, for some reason or other, the raising of the foot of the bed was omitted. Where the heart's action was weak, and the blood-pressure was low, recourse was also had to stimulants, to infusions of salt solution, etc. Care was also taken that the bandages did not compress the saphena or femoral veins. Lennander (*Centralb. f. Chir.*, May 13, '99).

Embolism.—Embolism is the arrest in the arteries or capillaries of some foreign body which has been carried along in the course of the circulation. The term "embolus" is applied to the foreign body or substance which, being carried in the blood-stream to some other part of the circulatory system, is arrested and forms a plug which occludes the vessel in which it is arrested, and may consist of a detached fragment of a thrombus, a vegetation or vegetations detached from the heart-valves, fragments of tumors which have grown within or into the blood-vessels, air-globules, fat-globules, etc.

The effects caused by arterial embolism are: First, a transient anæmia of the territory supplied by the occluded artery, which may pass away without leaving any permanent consequences. Secondly, necrosis of this territory, which may be either sudden, in the form of gangrene, or more gradual, in the form of softening or wasting. Thirdly, the formation of an hæmorrhagic infarction or congestion of the territory, followed by extravasation of blood into the tissues and the formation of a firm, solid, wedge-shaped patch of dark-red color, the apex of the wedge toward the embolus and the base toward the periphery. In the brain and other very soft organs the extravasation may disintegrate the tissue and cause the ordinary phenomena of an apoplectic clot. These hæmorrhagic infarcts may undergo a variety of changes. Degeneration usu-

ally sets in, the patch becomes more or less decolorized, undergoes molecular disintegration, contracts, and finally leaves a depressed fibrous patch in which the remains of the altered blood may often be recognized. Again, the patch may soften down into a puriform fluid, which may become enveloped by a fibrous capsule, and ultimately dry up or become the seat of calcareous deposit. These patches, when recent, are generally surrounded by a zone of congested vessels.

When the emboli possess irritating or poisonous qualities, such as those derived from the puriform softening of venous thrombi in cases of septic inflammation, the mechanical effects will be the same as those previously described. These emboli, however, set up a suppurative inflammation in their vicinity, wholly independent of any circulatory obstruction, and giving rise to pyæmic abscesses in all parts of the body, while the effects of obstructed circulation are more or less local in character. Simple emboli small enough to become first arrested in the capillaries either produce no permanent change, or, at most, a punctiform hæmorrhage; infectious emboli, however, occasion the miliary abscesses observed in pyæmia.

SYMPTOMS.—If the occluded artery be of some size and supply important organs, the symptoms will be those of temporary arrest of function of the part supplied by the artery, as transient paralysis, dyspnoea, coldness of the extremities, etc. Should the artery be small, and not supply important organs, no symptoms may be caused.

Fat-embolism.—Fat-embolism is caused by injuries, especially those of the bones and soft parts in which there is an abundance of fat, especially when there is considerable crushing of the parts and many fat-cells are broken down and lib-

erated. These minute fat-globules mingled with the effused fluids and wound secretions may enter the circulation through the lacerated vessels and produce positive symptoms, the severity of which depend upon the quantity of fat which has gained entrance into the circulation and the rapidity with which it has entered.

SYMPTOMS.—The symptoms usually develop within from thirty-six to seventy-two hours after injury, although fatal cases have been reported in less than twelve hours. The lesser degrees of this disorder are marked by restlessness, anxiety, slight dyspnoea, accelerated breathing, and rapid pulse. In more severe cases these symptoms become aggravated: general prostration rapidly increases; the face becomes pale and anxious; and, later, cyanosis, mental excitement, delirium, somnolence, and coma succeed each other. The dyspnoea becomes alarming, the respirations very rapid and finally stertorous. Oedema of the lungs develops; hæmoptysis may occur. The pulse—weak and irregular—finally becomes imperceptible. The temperature, at first below normal, may remain so, or, according to the development of secondary complications, may rise later. Examination of the urine will reveal oil-globules floating on the surface.

DIAGNOSIS.—The symptoms of fat-embolism resemble more or less those of shock, ether-anæsthesia, acute septicæmia, acute pulmonary and renal congestions, cerebral hæmorrhage, and embolism. From shock it differs in that its symptoms appear so late that the symptoms of shock should have in great measure subsided, and in many cases where the amount of shock has not been very great from the start. The effects of ether are not easily distinguished from the effects of fat-embolism; the appearance of

oil-globules floating upon the urine will denote the presence of fat-embolism. The symptoms of acute septicæmia are developed later than those of fat-embolism, and include a marked elevation of temperature and a more gradual development; the two conditions are not infrequently present in the same case. Not infrequently the sequence of shock, fat-embolism, and acute septicæmia is noticed. Although the symptoms of acute pulmonary congestion are sufficiently clear, it may happen that those of fat-embolism will be confounded with them.

ETIOLOGY.—Fat-embolism, to a greater or less degree, occurs in almost every fracture in adults and in operations involving the cancellous tissue of bone. Its most severe forms are likely to be developed in extensive compound and multiple fractures, causing symptoms which complicate and succeed those of shock and often resulting in death. This condition is rare in children. The conditions predisposing to it are patent blood-vessels bathed in secretions containing liquid fat and the application of some pressure tending to force the fat into the open vessels. The local congestion and the abundant secretions poured out into the wounded tissues for several hours after an injury cause a tension of parts, which furnishes such pressure.

PATHOLOGY.—The fat-globules, having entered the general venous current, are carried to the right side of the heart and onward with the blood-stream into the pulmonary circulation, the finer vessels of which they occlude, and the presence of the fat in which vessels gives rise to the primary symptoms. Gradually the oil-molecules are forced through the lung and pass on into the general circulation. The capillaries of the brain or spinal cord may arrest them and give rise to symptoms denoting disturbances of these or-

gans. The oil-molecules are, however, more frequently arrested in the kidneys and liver. The oil is excreted by the kidneys and may be found in the urine; its presence in the urine is of great diagnostic value.

PROGNOSIS.—Fat-embolism in its lesser degrees is speedily and spontaneously recovered from. When the symptoms are severe, the chances of recovery are slight. If the patient survives for forty-eight hours, recovery is probable.

TREATMENT.—To prevent this accident to any great degree is the first indication. To this end the injured part should be immobilized, and free drainage should afford relief from any undue tension. The vital powers, especially the heart-action, are best sustained and stimulated by alcohol, digitalis, and strychnine in full doses.

Phlegmasia Alba Dolens.—Phlegmasia alba dolens (milk-leg; white leg; marble-leg) is the term applied to a swelling of one or both lower extremities, beginning either at the ankle and ascending or at the groin and extending down the thigh, occurring usually between the tenth and twentieth days after confinement, and characterized by pain, tension of the skin, and a milk-like whiteness of the surface. The popular name "white leg" was received from its color when it was supposed to be due to a metastasis of milk. As the surface is glossy, as well as white, resembling that of polished marble, the disease is sometimes called "marble-leg."

SYMPTOMS.—As a rule, this affection is preceded by a slight access of febrile phenomena, but its onset may, as an exception, be announced by a chill or distinct rigor. Sometimes an indefinite feeling of malaise, with gastric disturbance, anorexia, coated tongue, and constipation, will be present for a day or two,

before the pain in the limb is complained of. Another premonitory symptom may be present, namely: pain and tenderness in the region of the womb, especially marked on that side corresponding to the limb about to become affected. The first characteristic symptom is the development in the limb of a dull, dragging pain, which is increased by motion. This soon develops, as a rule, into acute pain along the course of the femoral vein, in the calf, or above the ankle, according to the locality in which the affection originates. In these situations the thrombosed veins can frequently be felt, but not invariably, for the tenderness or the swelling may prevent its being made out. The pain and tenderness extend all over the affected parts, which may be the whole limb, causing a feeling as of aching in the bones. The pain is sometimes along the internal saphenous vein, which may be traced till it dips to join the femoral.

Concurrently with the appearance of pain, or within a day or two after it, swelling is observed, which gradually spreads and increases in hardness. This swelling does not resemble ordinary oedema or anasarca as to the sensation it communicates to the hand of the physician, or in the history of its commencement and progress. When it first appears, and again, as it disappears, it may be soft and may pit on pressure; later, when it is fully developed, a few days after its appearance, it is very tense and resilient, nearly as hard as a solid India-rubber ball, and does not pit on pressure. The swelling may spread at once all over the limb, but frequently it either commences above at Poupart's ligament and spreads downward or at the ankle and ascends. It is not often that the lower portion of a limb alone is affected; involvement of the upper parts alone is likewise very rare. The swelling affects all parts of

the limb evenly, and rounds off its figure, but does not distend the skin or destroy the form as in anasarca. Coagulable lymph exudes if the skin be pricked. An erythematous blush is occasionally noticed over parts of the limb, but this is not common, and may be confined to a narrow path along the course of a subcutaneous vein or a lymphatic vessel.

The limb may be kept in a state of extension or of slight flexion. Movement of it causes considerable suffering, and the power of voluntary motion is almost completely lost while the disease continues. The ordinary termination of this disorder is by absorption of the thrombus, with restoration of the circulation.

At the expiration of from five to ten days the symptoms begin to abate, the pain and swelling diminishing. The rate at which this proceeds varies greatly, being probably more or less directly in proportion as the permeability of the vessels is restored. In a favorable case it may be several weeks before the disease disappears; in other cases further or even indefinite delay may occur. The febrile movement in this disease is not usually severe; the temperature rarely exceeds 102° F., and is often less.

DIAGNOSIS.—The diagnosis of this disorder is usually easy, if the history of the disease is carefully considered. Oedema with phlebitis or accompanying varicose veins may resemble it, but the history of the case will usually differentiate them.

ETIOLOGY.—This disorder is most frequently observed during pregnancy and the puerperal period. Its appearance is probably favored by the hydræmic condition of the blood which prevails during the former period, and on the natural formation of thrombi in the uterine sinuses at its termination. Other conditions favor the appearance of phlegmasia dolens: convalescence from fevers—espe-

cially typhoid, dysentery, disease of the rectum, malignant uterine disease, uterine fibroids, arrest of the menses, and general malignant or tubercular disease. The disease has frequently been observed to affect the leg on the side corresponding with a previously-commenced pleurisy. When this disease occurs in connection with malignant disease of the uterus, it often assumes a light and chronic form.

Literature of '97-'98-'99.

Twelve per cent. of one hundred and thirty-five soldiers treated for typhoid fever in the Pennsylvania Hospital suffered from milk-leg. This is six or eight times as frequent an occurrence of this complication as has generally been noticed. No sufficient reason could be assigned for this. This trouble has usually been ascribed to phlebitis, but there is not necessarily any inflammation of the vein antecedent to the thrombosis. Da Costa (Inter. Med. Mag., Jan., '99).

PATHOLOGY.—In some cases this disorder may be considered as the extension of an inflammatory process from the genitalia to the perineum, the nates, and the upper portion of the thigh. If this be confined to the subcutaneous and intermuscular cellular tissue, the vessels may not become affected. If, however, the morbid changes follow the sheaths of the vessels, the walls of both veins and lymphatics become thickened, and in most cases secondary thrombosis results. In other cases thrombosis is apparently the initial lesion. It may occur spontaneously from a retardation of the blood-current; the presence of varicose veins will favor thrombosis. The crural and its branches, the tibial and the peroneal veins are the vessels usually involved. The intravenous coagula may, however, take their origin at the placental site, and, extending along the pampiniform plexus to the hypogastric vein, may

thence occlude the crural vein to Poupert's ligament, or, passing upward by the spermatic veins, they may obstruct the vena cava. In some instances the occlusion of one crural vein is followed by occlusion in the other; in that case phlegmasia develops in both extremities. From our present information, no theory of the disease can be regarded as absolute, definite, or exact.

COMPLICATIONS.—Among the less grave complications of this disease are inflammation and suppuration of the intrinsic joints of the pelvis, erysipelas, limited abscesses of periphlebitic origin, diffuse suppuration of the connective tissue, and gangrene of any part or of a varying amount of the entire lower portions of the affected limb. The more fatal complications are embolism and pyæmia. The former is consequent upon the detachment of a thrombus in the femoral, or in still larger veins, or of a slower breaking up of blood-clots into *débris*, more or less puriform, which enters the circulatory current, and induces a general toxæmia, septic or non-septic, according to the conditions under which the clots suppurate.

SEQUELÆ.—The most frequent sequel of this affection is persistent aching of the limb, which is increased by cold, dampness, derangement of the health, and exercise; more or less persistent œdema of the ankles, deficient muscular power, and even wasting of the limb have been observed. As a rare exception, great hypertrophy of the cellular or connective tissue has been noticed, simultaneous with muscular atrophy; this cellular hypertrophy may be associated with more or less extensive and intractable ulceration, which probably result from permanent destruction of large vascular areas (Duncan and Gervis).

PROGNOSIS.—The prognosis depends

upon the origin of the phlegmasia and upon the nature of the complications. The danger of death from sudden obstruction of the pulmonary artery is always present until the thrombus has disappeared or become thoroughly organized. Embolism has proved suddenly fatal as late as thirty-seven days after delivery.

TREATMENT.—The principal indications for treatment are: opium to relieve the pain, cathartics if constipation be present, quinine, iron, good food, and restoratives to sustain the strength and rest for the swollen limb. The extremity should be kept either in an extended or flexed position, whichever proves the more comfortable, and supported on a pillow raised at the foot, with the pressure of the bedclothes kept off by a cradle. Hot fomentations have been advised, but greater relief obtains during the early stages of the swelling by wrapping the limb in cotton batting sprinkled with equal parts of belladonna and chloroform liniments, with oil-silk outside. If vesicles form on the surface, they should be punctured and the fluid be allowed to escape. When the swelling is subsiding, and the limb begins to pit on pressure and the tenderness to subside, absorption may be promoted by gentle frictions with alcoholic lotions and by applying a light, flannel roller bandage evenly over the entire limb. The patient should not be allowed for any reason to leave her bed until every trace of tenderness and thickening has disappeared from the veins. For some time after recovery the patient will do well if she wear a long elastic stocking, as the limb will swell, as the result of standing or of protracted exercise. Frictions, bandaging, and faradization may be required to relieve the swelling, œdema, and muscular weakness. In using fric-

tions of all kinds the danger of dislodging a thrombus is not to be overlooked.

VASCULO-CARDIAC NEUROSES.

Palpitation.—Although this term means the rhythmical normal action of the heart, it is commonly applied to undue frequency of the beats, sufficiently marked to cause discomfort, accompanied by more or less irregularity in the rhythm.

SYMPTOMS.—The slight attacks of palpitation with which most of us are familiar are accompanied by more or less oppression and præcordial distress. During violent paroxysms these manifestations are increased in proportion, and the heart-beats may become tumultuous; the beat against the chest is violent; the patient can only speak with the greatest difficulty; his face is pale and covered with cold sweat, and he may suddenly lapse into unconsciousness. While the arteries throb violently, the throbbing may not correspond with the cardiac pulsations. The radial pulse may seem quite normal and violent cardiac action exist. Again, the heart may simply beat with greatly-increased force without necessarily involving the rapidity of its pulsations.

In some cases—individuals subject to “stage-fright,” for instance—violent palpitations may precede entrance upon the stage; as soon as this is accomplished, the heart’s action becomes regular in every way. Mental exertion here does what physical exertion will do in other cases, and what is branded “cowardice” in some young soldiers is often but the cardiac manifestation of excitement, which soon disappears after an action involving physical effort has begun. In some cases, especially hysterical women, the least emotion may bring on an attack.

The physical signs are negative, as a rule, unless some form of valvular disease be present. The ring of the sounds is merely accentuated. In cases of anæmia or neurasthenia a murmur is sometimes heard.

ETIOLOGY.—Palpitation is much more frequently met with among females than males, especially around puberty and the menopause. Uterine and ovarian affections and hysteria are commonly observed in cases subject to cardiac neuroses of all kinds. In men it is liable to occur when the anxiety of business and responsibilities of life accumulate. Emotions, excitement, and fear are well-known causes. The abuse of certain beverages, particularly tea and coffee, is considered a factor in the history of some cases. The inordinate use of tobacco may be included in this class of cases. Various diseases—especially digestive disturbances, anæmia, and chronic valvular disorders—are active as causative disorders in but a small proportion of cases. It may follow acute fevers and continued overexertion, as witnessed in armies—the “irritable heart” of Da Costa.

TREATMENT.—General tonics, especially strychnine, are indicated, besides appropriate measures for any general or local disorders that may be present.

Irregular Heart (Arhythmia).

SYMPTOMS.—Under this head is included a large number of types of cardiac irregularity both as to power of the heart-beat and as to time: *i.e.*, the interval between the beats. *Intermittence* is said to occur when one or more beats are missed more or less regularly. This is often due to undue weakness of a systole, the cardiac wave failing to reach peripheral portions of the arterial system. The *pulsus alternans* of Traube also denotes irregularity in the power

of the pulse-beat: *i.e.*, one pulsation being normal, the next feeble. The *pulsus paradoxus* of Kussmaul, observed during various disorders, especially pericarditis, aortic constriction, and myocardial debility, is a curious form of irregularity: the heart-beats are more frequent, but weaker, during inspiration than during expiration. The *pulsus bigeminus*, or twin-pulse, is characterized by two successive rapid beats, the diastole being shortened; then two successive slower beats, the diastole being lengthened. The first beat is usually stronger. This pulse sometimes denotes the presence of mitral disease, and it occasionally appears when digitalis is administered. Three or four beats may be thus united instead of two. In *delirium cordis* all the forms of irregularity mentioned may more or less co-exist as the result of an advanced heart-lesion, especially valvular and involving dilatation, or of exophthalmic goitre.

The rhythm of cardiac action is often disturbed, as instanced in the gallop, or *bruit de galop*, rhythm, in which succession of raps on a pavement by the hoofs of a horse while cantering is imitated. It is observed in advanced arteriosclerosis, interstitial nephritis, anæmia, and myocarditis. *Embryocardia* is another disturbance of rhythm, in which the sounds of the foetal heart are imitated, namely: great similarity between the first and second sounds and a shortened interval between each set of beats. It resolves itself into practically continuous beats of the same character. Embryocardia is observed when great dilatation is present or after prolonged fevers.

Cardiac irregularity may exist many years without being detected, and that in a person in apparently excellent health. But cardiac disease more or less marked is usually present.

ETIOLOGY AND PATHOLOGY.—The precise origin of arrhythmia is not known. The heart-wall is often found diseased, fatty degeneration and sclerosis extending to the coronaries being the prevailing pathological changes. The cardiac ganglia may be similarly affected. Besides the disease mentioned, arrhythmia may be due to toxic influences, the inordinate use of tobacco, coffee or tea, belladonna, aconite, digitalis, or veratrum viride.

Literature of '97-'98-'99.

Leyden contends that tobacco indulged in to excess undoubtedly causes myocarditis with true fatty degeneration of cardiac muscular fibres. The tendency of the profession is not to realize how permanent may be the cardiac injury its use may entail.

Mendel has noted, in a large number of cases of heavy smokers, that the arteries become thickened, hardened, and tortuous long before the atrophic changes of old age begin to be manifested. He has especially noted this arteriosclerotic condition in persons between thirty and forty-five years of age. *Berlin Correspondent* (*Med. News*, Jan. 22, '98).

It may also follow severe head-injuries attended by cerebral hæmorrhage or concussion, or attend various mental, gastric, hepatic, pulmonary, or renal disorders.

TREATMENT.—Rest of body and mind are important factors in the treatment of this condition. The patient is usually anxious concerning his condition, and imagines that death may overtake him at any moment. He should be quieted. Shocks, mental and physical, should be avoided; cold douches and debilitating hot baths should be avoided, tepid baths being recommended, followed by rubbing with a coarse towel. Attention to the diet and the avoidance of coffee, tea, tobacco, and sexual excitement represent

the most important hygienic rules to be observed. Tonics, especially strychnine, are always useful whatever be the cause; in some cases it may be given with digitalis. The bromides are of value for temporary use, but should not be persisted in, since they tend to debilitate the organism and thereby increase the cardiac disorder in the long run.

Rapid Heart (Tachycardia).

Abnormal rapidity of cardiac action, regular and unattended by other symptoms, is sometimes observed. Perfect health may exist notwithstanding, just as it may be present in association with an abnormally slow pulse. Tachycardia may only be said to exist therefore when from some cause a normal pulse is rendered abnormal, and so remain for a time more or less prolonged or in paroxysms varying in duration.

SYMPTOMS.—An attack of paroxysmal tachycardia may appear suddenly after a violent emotion, a fright, or represent the continuation of rapid action occurring as the result of violent exercise or excitement. The pulse may, under such circumstances, beat sufficiently rapidly to render counting totally impossible, especially since the sharp beat of the period of excitement is replaced by one which renders the pulse weak, compressible, and thin. In powerful individuals, however, it may remain hard and strong and may then be accompanied by great præcordial discomfort and pain: a condition resembling angina pectoris. All the manifestations of palpitation may then occur.

ETIOLOGY AND PATHOLOGY.—The true nature of this symptom is not established. Medullary disease, pressure upon the pneumogastric, or organic changes in either structure have been noted post-mortem. Wood ascribes the disorder to lesions of the accelerator centres. Mar-

tins considered it as the manifestation of an acute cardiac dilatation.

Most of these cases belong to one of three classes: (1) those in which there is paralysis of the pneumogastric or inhibitory nerve; (2) those in which the cardiac disturbances are reflex; (3) those in which the affection may be strictly considered to be a neurosis. H. C. Wood (Univ. Med. Mag., Mar., '91).

TREATMENT.—Huchard advises the following: 1. During the attack physical and mental repose must be secured. The patient should be placed in bed, and lie on the right side as much as possible. The head should be low, because syncope is always to be feared. Czermak and Quincke think that the heart may be slowed by light compression of one or the other of the carotids. In one of Nothnagel's cases the paroxysm could be arrested by deep inspiration; a spray of chloride of methyl in the præcordial region or on the back of the neck sometimes succeeds. Digitalis may be effective or not. 2. During the interval between the attacks, abstinence from tea, coffee, liquor, and, above all, from tobacco. Disturbances of the alimentary canal must be avoided, as well as any physical or mental excess. In cases where the arterial tension is very low, quinine and ergot in pill form have given good results. Antipyrine has been employed by Huchard without success, and veratrum viride has also failed. In several cases nothing has ended the paroxysm so quickly as an injection of morphine.

The application of the ice-bag to the præcordial region produces an increase of the systolic force by acting directly on the myocardium, an increase of the blood-pressure, diminution of the number of the cardiac pulsations, and the disappearance of irregularities of the pulse. It also favors the pulmonary circulation and the respiration. Isnel (Thèse de Paris, '95).

Large doses of digitalis (11 $\frac{1}{2}$ grains of the powder or 5 granules of digitalin) recommended in essential paroxysmal tachycardia. Bromide of potassium, in daily doses of 1 $\frac{1}{4}$ drachms given in the intervals, appeared, in his hands, to diminish the number and length of the attacks. H. Desplats (Jour. des Sci. Méd. de Lille, No. 23, '95).

Slow Heart (Bradycardia, or Brachycardia).

Slowness of the pulse is often observed in old people and occasionally during middle age, without evidence of impaired health. But a slow pulse does not invariably mean that the case is also one of slow heart, since every other beat of the latter may fail to be transmitted peripherally, and thus convey a wrong impression as to the rapidity of cardiac action.

SYMPTOMS.—A *bona-fide* case of slow heart—determined by auscultation—may give rise to no subjective symptom, especially when permanent; in some cases it occurs in paroxysms. In such patients vertigo is first complained of, and the sufferer may become unconscious; the enforced recumbent position with the head on a level with the body usually enables the patient to quickly return to consciousness, but, on attempting to rise, he is apt to resume the syncopal state. Tinnitus, *muscæ volitantes*, and marked prostration are complained of between the attacks. The pulse at such times may become extremely slow: below ten, in some cases. When such attacks occur in aged individuals death may occur, especially if the patient is allowed to assume even the sitting position suddenly. Such cases are rare, however.

ETIOLOGY AND PATHOLOGY.—Riegel, who has carefully studied this subject, states that the pulse may be greatly lowered during the puerperal state whether the labor be premature or at term and

during prolonged fasting. This he terms physiological brachycardia. The pathological variety often follows the acute fevers, especially pneumonia, typhoid fever, acute rheumatism, and diphtheria; and is the result of exhaustion (Traube). It may also be caused during gastric disorders, ulcer, cancer, or even chronic dyspepsia (the result, probably, of insufficient nutrition), and occasionally as the result of disorders of the respiratory tract, especially emphysema. It is not infrequently met with in connection with fibroid and fatty changes in the heart, but seldom with valvular disease. Nephritis; uræmia; poisoning by lead, tobacco, alcohol, coffee, and digitalis; anæmia, chlorosis, and diabetes; apoplexy, epilepsy, cerebral tumors, affections of the medulla, injuries of the cervical cord; general paralysis, mania, and melancholia; cutaneous and other affections of the genital tract, sun-stroke, and exhaustion from any cause, may, according to Riegel, be associated with slow pulse.

TREATMENT.—The recumbent position, strictly enforced, is of the greatest importance until the heart has resumed its normal action. Caffeine, chloride of ammonium, strychnine, and atropine are the most effective remedies, and digitalis in small doses may be given as a cardiac stimulant. Small doses of whisky or brandy—a tablespoonful of brandy or whisky in a little hot water repeated every two hours, when the patient can drink—is a very effective means. Large doses are more hurtful than beneficial.

VENOMOUS WOUNDS. See WOUNDS AND STINGS, VENOMOUS.

VERATRUM VIRIDE.—*Veratrum viride* (U. S. P.), or American hellebore consists of the rhizome and roots of *Veratrum viride* (Indian poke, poke-

root, or swamp-hellebore; nat. ord., *Liliaceæ*): a plant indigenous to the United States. This remedy should not be confounded with *phytolacca*, which yields the officinal poke-berries and poke-root. *Veratrum viride* contains a number of principles, the chief of which are, however, jervine and veratroidine, which are so closely associated with the resin as to be separated from it with great difficulty.

Preparations and Doses.—*Veratrum viride* (U. S. P.), 1 to 5 grains.

Extractum veratri viridis fluidum (U. S. P.), 1 to 5 minims.

Tinctura veratri viridis (U. S. P.), 1 to 5 minims.

Physiological Action.—*Veratrum viride* is a powerful spinal and arterial depressant, exerting little or no direct influence upon the cerebral centres. In full therapeutic doses it lowers the pulse-rate both by a direct action on the muscle (jervine) and by stimulating the inhibitory nerves (veratroidine); it diminishes the force of the heart-beat by a direct influence upon the cardiac muscle (jervine), and produces a general vasomotor paralysis (jervine) more or less complete, according to the doses. Under its action the functional activity of the skin is greatly increased; but, as this is a necessary result of the profound arterial impression, there is no reason for believing that the drug has any specific influence upon the perspiratory glands. In a similar manner the excretion of bile is often indirectly increased by *veratrum viride*, through the excessive vomiting which it induces (H. C. Wood). The temperature is lowered very decidedly by this drug, but whether directly or indirectly has not been determined.

Poisoning by *Veratrum Viride*.—An overdose of this drug is followed by a sensation of burning and pain through-

out the alimentary tract and an inability to swallow, accompanied with vomiting and diarrhoea; palpitation; slow, weak pulse; and labored respirations. The pupils are generally dilated. Convulsions may be present. Death may occur through paralysis of the respiratory centres. Overdoses of it provoke vomiting so soon and so certainly that it is somewhat doubtful whether a robust adult could be killed by a single dose of any of its official preparations, especially if prompt and judicious treatment were afforded. Alarming symptoms may, however, result from large medicinal doses repeated at short intervals, but they generally yield promptly to treatment.

Treatment of Poisoning by Veratrum Viride.—In cases of poisoning by veratrum viride Wood states that "vomiting should be assisted by copious draughts of warm water until the stomach is well washed out (lavage by means of stomach-siphon may be used). The patient should then be made to lie flat upon his back, with the head lower than the feet, and all efforts at vomiting should be restrained. If they cannot be checked, and if the prostration be severe, on no account should the patient be allowed to rise up, but must be made to vomit into a towel. A full dose of laudanum should be given by the rectum, and brandy or whisky be administered by the mouth. If the stomach refuses alcohol in any shape, the rectum should be made use of. Ammonia may be employed as an adjuvant to alcohol, and in extreme cases may be injected into a vein. Amyl-nitrite inhalations are said to have been of service. External heat is important, and mild flagellations, rubbing with coarse towels, sinapisms, etc., may be used to keep up external capillary circulation."

Atropine, alcohol, opium, coffee, hypodermics of ether and of strychnine, car-

diac and respiratory stimulants, extreme heat, and the head placed low are suggested by others.

Therapeutics.—The chief use of veratrum is as a circulatory sedative in acute, sthenic, or dynamic inflammations. In pneumonia, pleurisy, acute hepatitis, peritonitis, and cerebritis it is valuable as long as congestion alone is present; later it is not only useless, but harmful. In peritonitis aconite is preferred to veratrum viride on account of the tendency of the latter drug to provoke vomiting, which is harmful. This objection obtains to veratrum viride in cerebritis.

In puerperal fever it has been highly recommended, but must be used with care. In puerperal eclampsia large doses (20 to 30 drops) have been advised; it acts chiefly by its depressant action on the motor tracts of the spinal cord.

In excessive cardiac hypertrophy and in the irritable heart of strong, healthy men veratrum viride is of value.

In aneurism where the disturbance of circulation is great and arterial pressure is high, the drug may be used with great care to diminish the arterial pressure and to prevent rupture of the diseased vessel.

Veratrum viride is contra-indicated in all conditions of depression or exhaustion, and, if vomiting be feared, must not be given in peritonitis or gastritis, as it may cause emesis.

In acute inflammation 1 drop of the tincture may be given, every half-hour or hour, to a healthy adult. In the course of two or three hours or less the skin becomes moist or relaxed, the pulse slower and softer, and slight nausea may be present. These symptoms show that the drug is exerting its influence, and it should be withdrawn.

VESICAL CALCULUS. See URINARY SYSTEM, SURGICAL DISEASES OF.

W

WOUNDS AND INJURIES OF THE HEAD.**Diseases of the Scalp.**

Tumors.—A common form is the *sebaceous tumor*, or *wen*. Varying in size from that of a pin's head to an orange, occurring singly or multiple, of slow growth, smooth, round or oval in shape, movable beneath the integument, they are familiar objects. They are readily diagnosed from fatty tumors by their firmer consistence and smoother surface; evacuation and examination of contents will remove any doubt. The sebaceous cyst is distinguished from abscess by its slow growth, history, situation, mobility, and elasticity; the existence of the dilated opening of the sebaceous duct and the expression and examination of some of its contents will confirm the diagnosis.

The *treatment* is extirpation. After cleansing the hair and scalp the hair is evenly parted over the tumor, an incision made down to the sac, and the tumor enucleated. To prevent return, the sac should be entirely removed. Hutchinson reports a case in which an aggregation of small sebaceous tumors of the scalp became malignant in character. He, however, remarked the rarity of such disposition in sebaceous tumors.

HORNS.—If let alone, it occasionally happens that the sebaceous matter exudes through the sebaceous duct, and forms a scab or crust, which by a process of subdeposition becomes conical; and, being gradually pushed up from below, and assuming a dark-brown color by exposure, it forms an excrescence that resembles a horn. They may be removed by the knife.

WARTS AND MOLES.—Warts and moles are cutaneous hypertrophies. Warts when non-irritating and small

require no attention, but, if they show a tendency to grow, they should be removed by the knife, as they sometimes display a malignant character. Moles are of two kinds: the hairy and the pigmented. They may be removed by the knife under cocaine anæsthesia. A subsequent plastic operation or transplantation of skin may be necessary to cover over the denuded surface.

FATTY TUMORS.—Fatty tumors are rarely met with in the scalp. They resemble somewhat the sebaceous cyst, but are flatter, less globular, and more deeply seated. The treatment is similar to that of the sebaceous cyst: extirpation.

CONGENITAL CYSTS AND FIBROMATA.—Congenital cysts and fibromata are occasionally found in the scalp. They are easily recognized and removed.

PNEUMATOCELE.—Pneumatocele, or a tumor filled with air, may result from spontaneous atrophy of the osseous tissues, producing a communication with the mastoid cells. The air then extends underneath the pericranium, forming a painless, smooth, elastic tumor, which is tympanitic to percussion, and which disappears, usually, under pressure. The treatment, ordinarily employed, is to empty the sac by pressure or aspiration and then apply a compress and roller bandage.

CAPILLARY VARIX, NÆVUS, *ERECTILE TUMOR, VASCULAR GROWTH, OR MOTHER'S MARK.—Of these, two varieties are noted, depending upon the size of the capillary vessels which make up the tumor. When the capillary vessels are large, they usually form a *raspberry-like tumor*, at first small in size and somewhat elevated above the skin. Their tendency, if let alone, is to increase steadily in size, the capillary walls becoming thinner, until danger from

serious hæmorrhage threatens. This variety should be removed early, especially if the tumor show any tendency to grow in size or to extend laterally. If small, the tumors may be removed by excision or ligature, the base in the latter procedure being transfixed by a harelip-pin and the ligature passed beneath it before tying. If larger, two pins may be inserted at right angles to each other, or a double ligature may be passed around a single pin; the larger tumors are best ligated in sections. In any case care must be taken to insure the removal of the entire tumor.

The **PORT-WINE MARK** is composed of small, capillary vessels; extends over more or less surface; and exhibits little or no tendency to spread. It is more unsightly than dangerous. It is best removed by excision, if not too large, making the incisions so that a linear scar only shall remain. A small portion of the mark may be frozen, the surface cross-hatched with a fine knife, and the hæmorrhage arrested by firm pressure with blotting-paper. This process, repeated until the whole surface of the tumor has been treated, is said to be practically painless and to leave no appreciable scar. The cautery and escharotics have been used with success, but are not to be advised, on account of the unsightly scars which are left.

Cephalhæmatoma, or Caput Succedaneum.—During the birth of a child extravasation of blood and serum not infrequently occurs in that part of the scalp which presents, as a result of the passive congestion. The extravasation varies in degree according to the duration of labor and the severity of the pains. This swelling is called *caput succedaneum*. The seat of this extravasation is in the loose connective tissue external to the pericranium. The

tumor is usually situated over the occipital or parietal bones near the posterior fontanelle, and is soft and painless. When the extravasation occurs beneath the pericranium, detaching the latter from the bone, the tumor is called *cephalhæmatoma*.

These conditions seldom require treatment, as they gradually diminish in size and finally disappear in a few days or weeks.

Literature of '97-'98-'99.

Fatal case of hæmorrhage under the scalp in a newborn infant. After delivery with forceps, the supposed caput, instead of decreasing, became larger, was found to be soft and fluctuating, and due to effusion of blood. On third day tumor extended over whole cranium. Infant pale; rectal temperature only 96.8° F. Tumor still increased, extending over frontal bones and down sides of skull. Death on tenth day. Autopsy showed firm blood-clot under scalp and above periosteum over entire cranium. C. W. Townsend (Boston Med. and Surg. Jour., Mar. 3, '98).

Wounds of the Scalp.—These are of common occurrence, and are more serious than similar injuries located elsewhere, especially in persons of vitiated or impaired constitution. These injuries are more likely to be followed by erysipelas, and have a great tendency to the propagation of inflammatory action inward to the brain, which latter gives a serious or even fatal aspect to comparatively slight lesions. It must not be forgotten, however, that the blow or fall which occasions the scalp-wound may produce concussion or even laceration of the brain. So far as the tissues of the scalp are concerned, there is little danger, for they are freely supplied with blood and are endowed with great vitality, so that repair is favored and sloughing seldom occurs even when the tissues are severely contused and exten-

sively lacerated, the existence of a slight pedicle of attachment sufficing to insure the vitality of a large flap. It is, therefore, important to save all portions of the lacerated tissue unless entirely detached.

TREATMENT.—In all wounds except very small ones the head should be shaved over a wide area, to insure thorough cleansing and disinfection. All dirt and foreign matters should be removed by rubbing the surface with olive-oil, washing well with Castile soap and warm water, and finally scrubbing the surface thoroughly with a solution of bichloride of mercury (1 to 1000). If the wound be a simple cut, it will often suffice to bring the edges together with a strip or two of adhesive plaster; it is generally better to bring the edges together and secure them accurately with sutures. A generous sublimate dressing should be applied and retained by a recurrent head bandage.

Literature of '97-'98-'99.

Conclusions regarding contusions of the scalp as follows:—

1. Contusions of scalp caused by slight blows or falls, accompanied by moderate amount of effusion, are simple and require little treatment.

2. Contusions of scalp caused by sharp blows or severe falls are always to be examined carefully, and a guarded prognosis given.

3. Those accompanied by large effusions, and especially if pulsating, should be treated by shaving scalp, incising, turning out clots (examining carefully the pericranium and skull), securing bleeding-points, closing with sutures, preferably braided silk, dressed with dry antiseptic dressing, which should only be removed when absolutely necessary, before the fourth or fifth day, when sutures should be removed, a light compress bandage applied.

4. Those accompanied by little or no swelling, when caused by severe blows, should be carefully watched, and on first

appearance of local fever or swelling, freely incised, washed out and treated as open wounds.

5. If the case is not seen until patient has had chills, hot dry skin, hard pulse, fever-coated tongue, nausea or vomiting, insomnia, nervous twitchings, or any other symptoms of meningeal inflammation, we should cut down and trephine at once over site of injury.

6. While inflammation of either pericranium or the meninges is one of the things likely to follow these injuries, it may be prevented by early incision.

7. Where caries of bone or meninges occurs, the cause may generally be found to be injury of pericranium, which becomes inflamed, effusion follows, then inflammation of vessels from pressure, and then, by extension, meningitis. F. F. Lawrence (Columbus Med. Jour.; Indian Lancet, July 16, '97).

Though the scalp be bruised, lacerated, and begrimed with dirt, as well as wounded, or a larger or smaller flap be separated from the bone, none should be cut away; but, after shaving the head and arresting hæmorrhage by ligature or compression, it should be cleansed and disinfected thoroughly and the parts replaced in their proper positions. The parts may then be retained and supported by a few strips of plaster, and silver-wire sutures may be inserted at the points of greatest traction. Usually no drainage will be required, but, if necessary, a few strands of disinfected horse-hair will meet the indications, to be removed, however, in a day or two. To insure an aseptic course of healing thorough and wide disinfection should be practiced.

Abscess of the Scalp.—Abscess of the scalp may follow erysipelalous inflammation, contusions, or the imperfect disinfection and careless dressing of wounds of the scalp.

The symptoms of abscess are an erysipelalous condition of the scalp, accompanied with pain and usually marked

œdema and pitting on pressure. There is usually some fever, at times intense and often accompanied with delirium. There is great danger from the burrowing of the pus; if it burrow beneath the pericranium, and sometimes if more superficial, there is danger that the inflammation may extend inward to the brain through the vascular openings in the skull and cause meningitis.

TREATMENT.—Free incision should be made, as soon as the abscess is discovered, at the most dependent point. Disinfection of the wound and drainage should be followed by antiseptic dressings and drainage.

Contusions of the Scalp.—These are commonly the result of blows or falls which leave the patient more or less stunned. Localized swelling occurs at the point of impact, which is due to hæmorrhage and effusion under the scalp, the latter being raised up into a soft, semifluctuating tumor, the edges of which feel hard, while the centre feels soft. In some cases this extravasation simulates a depressed fracture of the skull, especially in children, and this deceptive feeling will occur without any considerable extravasation of blood beneath the scalp, the depressed centre being due to the compression of the scalp by the blow that has inflicted it (Erichsen). In case of doubt it will be safer to make an incision so as to examine the state of the bone, but usually the smooth bone can be felt at the bottom of the soft central depression.

TREATMENT.—The treatment of contusion of the scalp is very simple. The use of some evaporating lotion or lead-water and laudanum with slight pressure is usually sufficient. Under no circumstance should the swelling be punctured or the blood let out in any other way. Erichsen has found contusion of

the scalp in girls and young women in some cases to be followed by severe neuralgic pains in the part struck. In such cases incisions down to the bone have been followed by improvement.

Severe contusions may cause concussion or laceration of the brain.

Technique of Intracranial Surgery.—

The consideration of the technique of cerebral operations as here presented is that advocated by L. McLane Tiffany, of Baltimore. It is important to notice that these operations may be rendered necessary by traumatic or pathological lesions. The two should be considered quite separately, since comparison between them is almost impossible. In traumatic cases operation is undertaken as a matter of necessity, suddenly, perhaps with instruments not entirely suitable, but certainly without delay, the condition of the patient not permitting it. No previous preparation of the patient or preparatory treatment has been possible. His general condition is unknown. Septic elements are often—indeed, generally—present, not only upon the surfaces, but have, perhaps, been introduced deeply into the tissues by the traumatism for which the operation is undertaken, and infection may have already occurred within the head. The condition of the kidneys may be unknown to the surgeon; for, even though the urine be examined immediately after the injury and before the operation is undertaken,—and this should always be done,—yet, if the patient has been transported a certain distance in cold weather, or the surface of the body has been largely uncovered, as is not unusual after an injury, albumin may generally be found, and possibly also casts. The details in operative work, also, are often obscure, and landmarks obliterated, both within and without the skull. The head

is opened, in traumatic cases, as circumstances permit or seem to indicate. The head may have already been opened before the case is seen by the surgeon, who is forced to do patch-work.

In operations for pathological conditions the reverse of what has been said exists. The proper time is chosen; all things are prepared beforehand; the proper light is provided; asepsis is secured; there is a due regard for both local and general cleanliness; the condition of the internal organs has been learned, and they have been made to functionate properly; a well and carefully considered operative procedure is carried through after due study and consideration, and all necessary things are at hand. The operation then is undertaken in the best way for the patient's welfare.

An aseptic field of operation is pre-eminently essential to success. In cerebral surgery it is best that the whole head should be prepared and cleaned in all cases, unless of a very minor character.

In traumatic cases the head is to be shaved and the skin cleaned with green soap, hot water, nail-brush, and carefully scrubbed. The ears should be cleaned out and filled with sterile cotton. The eyes should be closed with pads of sterile cotton. The scrubbing should be done, not only upon the surface, but, if a wound exist, it should be scrubbed likewise, and an effort made to get out any dirt which has been forced beneath the skin; punctured wounds should be laid open; tracks beneath the skin should be opened and scrubbed; the edges of irregularly-bruised tissue may be trimmed away and a clean surface obtained. When coal-dust or grease has been forced beneath the surface, scrubbing with a nail-brush and soap and

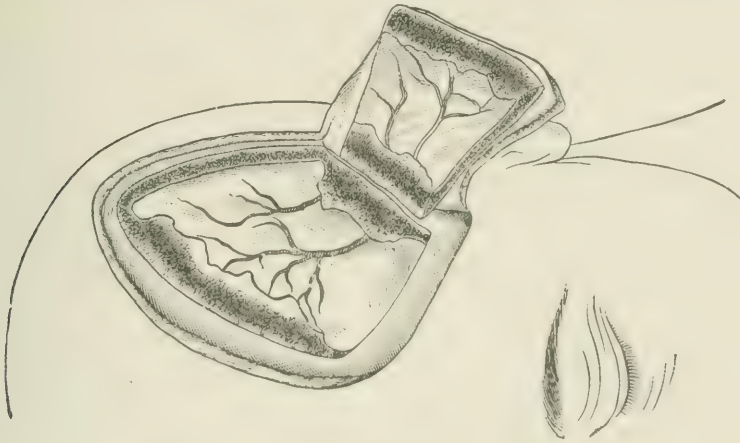
washing with ether and alcohol will often be sufficient to obtain a clean surface. Dirt ground into the surface or edges of broken bone can be scraped away, or nibbled away with forceps, so as to be gotten rid of. After cleansing the head for traumatic operations a towel wrung out in corrosive-sublimate solution (1-2000), or sterile water, perhaps, can be used as a cover for the prepared region until the instruments and other things are ready. In preparing a patient for an operation undertaken for some pathological condition (not traumatic, of course) the patient is prepared a day before the operation, and then again just prior to the operation. An alkaline (sodium bicarbonate) solution may be found useful to remove dandruff from the scalp, but Tiffany advises the use of green soap. Shaving and scrubbing with green soap, or a poultice of green soap applied over the surface after shaving and left on for a couple of hours and then scrubbing afterward, is efficacious. The green soap should be removed with alcohol, then ether, and the clean scalp tied up in a moist corrosive-sublimate dressing until the following day; a repetition of the cleansing as already described gives a clean surface upon which to operate.

As the brain is to be covered in after the operation, a large horseshoe-shaped osteocutaneous flap with a diameter of about three inches, the base turned toward the source of the blood-supply, is probably the most effective manner of uncovering the brain. It should be cut in one piece so as to permit of being turned down. This breaking down at the base is facilitated by cutting across the bone with sharp forceps, or otherwise, and it should be so cared for during operation that the skin and bone are not torn asunder; it may be necessary to

envelop it in a cloth wrung out in hot, sterile, salt solution.

The patient being in the semirecumbent position, in order to diminish the amount of hæmorrhage, the fissures—so far as desired—may be marked on the scalp with an aniline pencil; and also three points on the bone beneath—the point at which the centre-pin of the trephine is to be applied, and the upper and lower ends of the fissure of Rolando at points just outside the flap; the centre-pin of another trephine may be used for this purpose. The cutting of the bone is to be done by the instrument

upper corners just sufficiently large to allow the application of a small trephine. As soon as the holes have been drilled a director with a beak turning off almost at a right angle, and grooved so as to properly direct a thin piece of whalebone between the dura and bone, is inserted with the beak placed between the dura and skull. The whalebone threaded on the end with a long piece of strong and thin silk is then pushed gently on in the direction of the other trephine opening until it comes in view, when the thread is partially drawn out. Each of the remaining sides of the flap is treated in a like manner. One end of the threads is attached to a wire screw, and the saw



Temporary resection of the skull. (*Chipault.*)

(*Gazette des Hôpitaux.*)

with which the surgeon is most familiar: the trephine, the rapidly-revolving saw, chisel and mallet, the Gigli wire saw, all have their advocates. Should the opening not be large enough in the skull, there should be no hesitation to cut away the borders of the opening with rongeur forceps until sufficiently large.

Literature of '97-'98-'99.

The wire saw in resecting a portion of the cranium is used as follows: Having decided upon the outline of the three-sided flap which is to be turned down, two small incisions are made at the

drawn through between the skull and the whalebones. The skin-incisions are now completed and the bone sawed through. Leonardo Gigli (*Centralb. f. Chir.*, No. 16, '98).

There is a difference between the sides of the skull and the top; bone need not be put back in the temporal fossa, for, by reason of the presence of the dense temporal fascia, there is not much sinking in; it is otherwise at the top and front of the skull, as an absence of bone results in a deep depression. The time consumed in exposing the brain is largely the result of the bone-cutting.

It is therefore a matter worthy of thought and careful consideration whether, when it becomes necessary to operate within the head, it may not be expedient to raise a large flap, remove the necessary bone, replace the flap, and allow it to heal. A month or two afterward the surgeon can operate to remove the pathological condition more rapidly, bone not obstructing.

Literature of '97-'98-'99.

All operations on the brain should be done in two, or even more, stages, with a few days' interval between. A. Chi-pault (*Gaz. des Hôp.*, May 26, '98).

It has been observed that opening the skull, even in incurable cases, may diminish pain and optic neuritis. The dura is to be divided and turned aside as a flap, the line of division being about one-third of an inch internal to the bone-section, so as to allow of suturing and replacement. In general, the dura is to be respected and treated like other serous membrane, and with no more consideration.

Hæmorrhage from the skin may be arrested with hæmostatic forceps. With a transverse bar at the top, a T-shaped blade, a large area of skin would be pressed upon and bleeding be better arrested; perhaps the T-shaped blade could, with advantage, be covered with rubber. Encircling the cranium with a rubber band has yielded satisfactory results. Hæmorrhage from the bone during the cutting may be arrested by Horsley's aseptic wax, or pressure with dry gauze. By crushing in the edges of the bone with heavy forceps bleeding from the diploë may usually be arrested. In hæmorrhage from the dura a fine ligature passed around the artery and tied suffices to stop bleeding. Venous hæmorrhage may be arrested in the same manner. Hæmorrhage from a sinus may

be arrested in several ways: by suturing the wound in the vessels with a curved needle, passing the thread around it and tying it, and by gauze pressure. After turning the dura back and exposing the surface of the brain, bleeding-vessels are to be looked for and tied carefully, without dragging, by two ligatures, and divided between. Forceps will generally tear off, and should not be employed, save very temporarily. Serre-fines may be of use.

Tumors within the brain will push up sulci from below, so that vessels can be tied more easily than in the normal brain. A growth should be encircled by ligatures under these circumstances. The material used in ligating varies. Tiffany used very fine sterile silk. Finally, there is that form of hæmorrhage which may come from the exposed surface of a growth, and is usually denominated parenchymatous. Pressure with gauze will effectually arrest this. It may be that the gauze can be taken away at the end of the operation; usually it is to be left protruding and removed in two or three days.

In regard to the anæsthetic: Special indications for one or the other anæsthetic lacking, chloroform may be employed, as intracranial congestion is probably lessened thereby. Under ether the face becomes congested; a similar condition may obtain within the skull.

Tiffany has a cast of the brain at hand to refer to, while operating, for comparison with the exposed area. Electrical stimulation of the exposed area, by methods now well known, aid the operator.

When operating for a tumor of the brain which is covered by the cortex, the color and consistency of the exposed area may give information, but an incision will probably be of advantage.

Certain growths have the same consistency as the brain, and have been traversed by needles without recognition; hence color and consistency failing to be recognized, probably an incision into the brain is best; touch followed by incision, if the tumor does not present, is far better than touch followed by puncture, unless a cyst is discovered.

In many cases of tumor, the cortex is greatly displaced, but it is also probable that where the cortex is removed restoration of function, to a certain extent at all events, will follow. Circumscribed growths may be taken away by spoon, finger, knife, etc., but infiltrated growths, while they may be taken away, so far as can be recognized by the operator, give most unsatisfactory ultimate results, recurrence being the rule. The dura, being removed, should be replaced by gold foil, as advised by Beech, of Boston; or by rubber tissue, as practiced by Abbe; or by a thin sheet of celluloid, as employed by McCoch; or egg-membrane (Freeman) to prevent adhesions between the brain and scalp.

Literature of '97-'98-'99.

The following advantages are claimed for the use of egg-membrane in cerebral surgery: 1. That it is inexpensive and can be easily obtained where such substances as gold foil are not at hand. 2. It is not in the full sense of the term a "foreign body," but seems, in a measure, to incorporate itself with surrounding tissues without causing perceptible irritation or the formation of noticeable cicatricial deposits. Even though it ultimately becomes absorbed, it remains intact sufficiently long to accomplish the purpose for which it was inserted. 3. There is no danger of subsequent infection requiring a second operation and leading to extensive formation of connective tissue. Leonard Freeman (*Annals of Surg.*, Oct., '98).

Intracranial sutures may be of silk

or fine catgut. To obtain a bone-flap where it is thought necessary, when the natural bone is lacking, different expedients have been made use of: the periosteum from the tibia has been transferred to the head; the outer table of skull, while connected with the skin, has been fashioned as a flap to turn over and cover the defect; the removed bone, perforated with holes so as to permit of drainage, has been used; bone-chips obtained by the use of the chisel or gouge on the adjacent sound bone have been placed on the dura, as a mosaic with the outer side downward. These are known as autoplasty. When a piece of foreign material, as silver, celluloid, decalcified ox-bone, calcined ox-bone, or aluminium is used, it is called heteroplasty.

Literature of '97-'98-'99.

Series of experiments on the skulls of animals to determine what happens to the disk of bone transplanted in the hole made by the trephine.

It was found that the implanted bones undergo necrosis in the central parts, but that there is a more or less extensive zone at the periphery which preserves its vitality, and becomes incorporated with the newly-formed bone. The extent of this peripheral area is closely related to the youth of the subject and the slenderness of the cranium—the younger the subject and the thinner the skull, the greater the peripheral area of retained vitality in the implanted bone. The rapidity with which the dead parts of the bone become absorbed and the new bone formed is closely related to the youth of the subject and to the sponginess of the bone. Experiments with decalcified and with calcined bone clearly showed the greater advantage of the latter in the formation of strong bony tissue. Valan (*Archiv. per le Sci. Med.*, vol. xxii, No. 19, '99).

For the skin subcutaneous sutures of silk-worm gut are desirable. When the

head has been opened for extensive operation, drainage is important. A piece of silver wire hooked in the lower angle of the wound, or a small drainage-tube will answer; if the latter, it should be removed after twenty-four or forty-eight hours, unless abscess develop, when it should remain several days. A voluminous dressing of sterile absorbent gauze secured by roller bandage or night-cap will afford protection and support. The time when dressings are to be changed will vary with the conditions present. As a rule, half the stitches may be removed on the fifth or sixth day; the remainder by the seventh or eighth day. Absolute quiet of mind and body should be observed for the first week, and no visitors, letters, or other disturbance for two weeks at least.

Literature of '97-'98-'99.

In 104 craniectomies had 6 deaths. Of 57 adults operated upon no deaths from shock of operation; 3 died from sepsis; 1 from hæmorrhage, and 2 from complications due to teething (one seven days, other ten days after operation). Patients removed from operating-table without showing any shock or unfavorable symptoms other than those following serious operation. Electric saw used after trephine. Powell (Archives of Ped., May, '99).

Cerebral Localization.—In addition to the motor areas around the fissure of Rolando, operating surgeons should be familiar with the relations of the temporo-sphenoidal lobe with ear disease; the supramarginal convolutions in puncture of the lateral ventricles; the angular convolution in word-blindness; the occipital lobe in lesions of sight; in fact, the relations of the whole brain, except the anterior extremities of the parietal lobes. Chiene, of Edinburgh, suggests the following method of cerebral localization: Shave the head and

find, in the median line of the skull, between the glabella (*G*) and the external occipital protuberance (*O*), the following points: The midpoint (*M*), the three-fourths point (*T*), and the seven-eighths point (*S*). Find also the external angular process (*E*) and the root of the zygoma (*P*) immediately above and in front of the external auditory meatus. Having found these five points, join *EP*, *PS*, and *ET*. Bisect *EP* and *PS* at *N* and *R*; also bisect *AB* at *C* and draw *CD* parallel to *AM*. The pentagon (*ACBRPN*) corresponds to the temporo-sphenoidal lobe, with the exception of its apex, which is a little in front of *N*. *MDCA* correspond to the Rolandic area, containing the fissure of Rolando, and the ascending frontal and the ascending parietal convolutions. *A* is over the anterior branch of the middle meningeal artery and the bifurcation of the Sylvian fissure; *AC* follows its horizontal limb. The lateral sinus at its highest point touches the line *PS* at *R*. *MA* corresponds to the precentral sulcus, and, if it be trisected at *K* and *L*, these points will correspond to the origins of the superior and inferior frontal sulci. The supramarginal convolution lies in the triangle *HBC*. The angular gyrus is at *B*. (For motor, speech, and special sensory areas, etc., see illustrations in TUMORS OF THE BRAIN.)

Diseases, Malformations, and Injuries Involving the Skull.

INFLAMMATION, PERIOSTITIS, OSTITIS, CARIES, and NECROSIS may occur in the cranial bones. The symptoms are very similar to those produced by the same processes elsewhere. In necrosis of the cranial bones there is always the danger of extension of the inflammation to the membranes of the brain and inflammatory effusion within the skull, producing convulsions, coma, or death. Af-

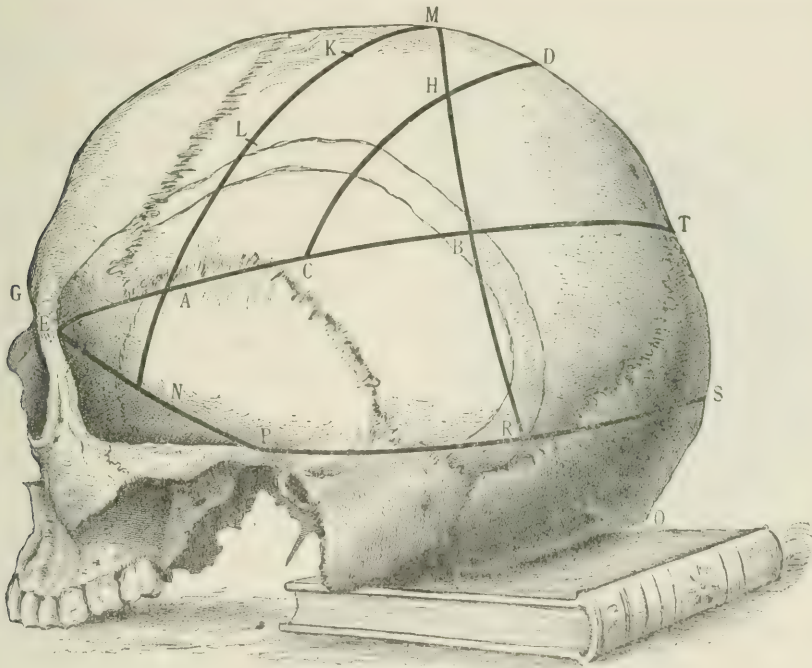
fection of the petrous portion of the temporal bone gives rise to the greatest danger, on account of the homogeneous structure of the bone and the continuity of the dura mater with the lining of the cavities by which it is perforated. When the frontal bone or the vault is the seat of disease, cerebral complications are less likely to occur.

Symptoms.—When the vault or forehead is affected there is tenderness, with

deep-seated pains in the head, persistent œdema of the eyelids, and a fœtid discharge from the nose will be present.

Etiology.—These inflammatory disorders of the cranial bones are usually consequent upon injury or constitutional syphilis; more rarely they result from struma (tuberculosis) or follow typhoid fever.

Prognosis.—Necrosis of the petrous portion of the temporal bone is generally



Cerebral localization. (*Chicou.*)

(*Edinburgh Medical Journal.*)

some puffiness, and gradual elevation of the scalp into an abscess. If this be opened, the necrosed bone may be seen or felt at the bottom of a sinus or unhealed ulcer. When the petrous portion of the temporal bone is affected, there will be a history of earache, followed by a profuse fœtid discharge from the ear, with tympanic perforation, escape of the middle-ear bones, and deafness. When the sphenoid or ethmoid is affected,

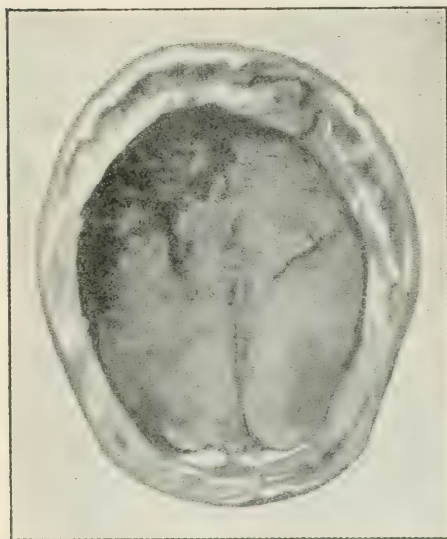
incurable, death usually resulting from encephalitis. In necrosis of the sphenoid or ethmoid little can be expected from operative interference, though in the latter case portions of the sequestrum may occasionally be extracted through the nasal cavity.

Treatment.—The treatment of the inflammatory disorders of the bones of the skull follows the general rule of treatment of these disorders. It is, however,

especially important that by absolute cleanliness, frequent dressings, and the liberal use of antiseptics, the parts be kept, as far as possible, in an aseptic condition. (See also OSSEOUS SYSTEM, DISEASES OF.)

HYPERTROPHY OF THE BONES OF THE SKULL, with increase of density and obliteration of the diploë, may result from *ostitis deformans* or hereditary syphilis. Treatment is seldom required.

A very interesting specimen of hyperostosis cranii donated by Herwirsch to



Hyperostosis of the cranium. (*Herwirsch*.)

the College of Physicians of Philadelphia is from a woman aged 71. The patient enjoyed good health up to her sixty-fourth year, when rheumatism confined her to bed for one year. Previous to this had lively disposition and was a hard worker. During this illness enlargement of head began. She became listless, disinclined to any conversation, and made frequent cries at night. She had insomnia, and near her death she refused food and became comatose. Head measured 71 centimetres in fronto-occipital circumference. Lower half of head not enlarged. Calvarium soft and friable. Brain weighed 1360 grammes (48

ounces); normal except some ventricular dilatation and thickened dura. Skull at thickest part (right occipital) measured 3.5 centimetres; at the frontal 2 centimetres, and at thinnest portion (left temporal), 1.4 centimetres; weight of skull-cap, 1870 grammes (4 pounds, 2 ounces). *Guy Hinsdale* (*Codex Medicus*, May, '96).

ATROPHY OF THE BONES OF THE SKULL.—This condition is often observed in senile skulls, and appears to be one of the phases of general wasting atrophy incident to senility. When observed in young subjects this condition is generally due to hereditary syphilis. The cranial bones may become so thin that they will crackle on slight pressure. Its favorite location is the occipital bones; it is often called *craniotabes*. The treatment for these latter cases is that for hereditary syphilis combined with codliver-oil and the hypophosphites of lime and soda. All mechanical injuries—blows, falls, etc.—must be averted.

MICROCEPHALUS.—When a child is born with complete ossification of the skull, even at the fontanelles, or when ossification is completed soon after birth, microcephalus generally results. To remedy this condition and allow a more rapid expansion and growth of the brain Lannelongue has suggested that a groove, about a quarter of an inch wide, be excised in the skull. This may be made on one side of the sagittal suture or on both sides, and may extend from the front line of the hair on the middle of the forehead well back into the occipital bone, and may have lateral branches. This operation should be done on only one side at a time, and is not devoid of danger, since the general vitality of such children is usually impaired. Keen, of Philadelphia, reduces the time of operation to not more than

thirty minutes by using a rongeur forceps which he has devised for the purpose.

Tumors of the Skull.—Exostosis, or bony tumor, may occur as a result of injury, but is usually a tertiary syphilitic manifestation, a result of a syphilitic gumma. If the growth is within the skull it is called an enostosis; if external, exostosis.

The general treatment is that for syphilis of the bones. If the tumor is external and gives annoyance, it may be removed. If internal, and it can be located by its pressure effects upon the brain, the skull should be trephined and the tumor removed. Sometimes a growth upon the outside corresponds with a similar growth within the skull.

SARCOMA.—Round-, spindle-, and giant-celled sarcoma may affect the bones of the skull. The tumor may arise in the dura, the diploë, or in the periosteum. As the size of the tumor increases so does the danger and deformity. Sarcoma arising from the dura perforates the cranium and sometimes spreads underneath the scalp, finally breaking through the latter. The opening in the bone, the pulsation of the mass, its partial or complete reducibility, generally accompanied with symptoms of pressure, and the presence of the optic neuritis which often results from it, enable one to diagnose this growth.

The growth may be removed, but recurrence always follows. The operation itself involves such danger as often to be fatal, especially if the superior longitudinal sinus be involved.

EPITHELIOMA sometimes invades the cranial bones. Like sarcoma, it is a malignant disease, and is treated on the same general principles.

FRACTURES OF THE BONES OF THE SKULL. See FRACTURES.

Diseases, Malformations, and Injuries Involving the Brain.

Inflammation of the Brain. See ENCEPHALITIS.

Abscess of the Brain. See CEREBRAL ABSCESS.

Meningocele, Encephalocele, and Hydrencephalocele. See ENCEPHALOCELE.

Hydrocephalus, Acute and Chronic. See HYDROCEPHALUS.

Intracranial Tumors. See TUMORS OF THE BRAIN.

Traumatic Intracranial Hæmorrhage.

—Extravasation of blood commonly occurs in all injuries of the head accompanied by laceration of the brain, and in many in which the skull is fractured and the brain uninjured. Intracranial hæmorrhage is favored by the great vascularity of the parts within the skull, the large sinuses, the numerous arteries that ramify both within the bones and at the base of the brain, and the intricate vascular net-work extended over the surface of the brain.

The extravasation may occur in three situations: Between the dura mater and the skull (extradural); between the dura mater and the brain (subdural); within the brain-substance and its ventricles (cerebral).

Extradural Hæmorrhage.—This form of hæmorrhage is also called *meningeal extravasation*, as it most commonly arises from rupture of the middle meningeal artery or its branches, which, from its location in a deep canal in the parietal bone, is peculiarly liable to rupture in injuries of the side of the skull.

SYMPTOMS.—The symptoms of extradural hæmorrhage are those of compression, divisible into three stages: concussion, a return and some continuance of consciousness (pathognomonic of this condition), and then coma gradually supervening. The patient is at first

stunned by the accident; from this he quickly recovers and then relapses into unconsciousness, which gradually increases in intensity. He becomes dull and sleepy, with a slow, laboring pulse, dilated and sluggish pupils; and a tendency to slower respiration. As the compression increases, complete stupor supervenes, with stertorous breathing, and the appearance of either general paralysis or hemiplegia of the side opposite to the injury.

DIAGNOSIS.—The diagnosis of this and the following (subdural) form of hæmorrhage from the *cerebral* form is important, as no operative interference in the latter case would be successfully undertaken, for the reason that the injury to the brain-substance is usually so extensive that, even were the clot removed, the patient would die from the injury. Attention to the symptoms of each variety will usually be sufficient to differentiate them.

The diagnosis between compression from *extravasation* and that from *depressed bone* or *inflammatory effusions* within the skull is generally easily made. In depressed fracture the compression symptoms continue uninterruptedly; examination will reveal the injured bone. Compression symptoms due to inflammatory effusions are preceded by symptoms of cerebral inflammation, and are accompanied by a strong febrile movement, accelerated pulse, and hot skin; the character of the scalp-wound and the separation of the dura mater when pus is effused distinguish this form from that in which the pressure is the result of extradural or subdural hæmorrhage.

From apoplexy differentiation is not easy. From drunkenness, the absence of injury, the odor of the breath, and the flushed and turgid face would point to alcoholic intoxication.

In opium narcosis the pupils are strongly contracted, instead of being widely open as in coma from cerebral compression.

ETIOLOGY.—Extradural hæmorrhage may occur with or without fracture of the skull. When the result of fracture, it is caused by the fissure tearing across the meningeal artery or more often one of its branches distributed on the interior of the skull, or a fragment of bone wounding a sinus or the vascular net-work on the cerebral surface.

PATHOLOGY.—The blood that is extravasated usually coagulates into a firm, granular clot. This clot may be absorbed entirely; the serous portions and coloring matter may become absorbed, leaving a fibrinous, buff-colored clot, which may become organized; and finally the exterior of the clot may become organized, while the interior may contain fluid and disintegrated blood.

PROGNOSIS.—The mortality of these cases treated upon the expectant plan (without operation) is very high. Wiesmann reports 147 cases treated expectantly with 131 (89.1 per cent.) deaths, while of 110 cases operated on only 36 (32.7 per cent.) died, and in the majority of the fatal cases the extravasation was not reached and the clot therefore not removed.

TREATMENT.—Operative treatment should be resorted to as soon as the diagnosis has been clearly made. The localizing symptoms should determine the spot to be trephined. Krönlein has shown that, in the greater number of cases, the clot will be most easily reached by trephining one inch and a quarter behind the external angular process at the upper level of the orbit. If the clot is not found by this opening we may trephine just below the parietal boss, on the same level with the former opening.

The main trunk and the anterior branch of the middle meningeal artery are reached by the anterior opening, and the posterior branch by the posterior opening. If the clot be discovered it should be removed, enlarging either trephine opening, if necessary, by the rongeur forceps. If the pupil be dilated, showing that the clot is gravitating downward toward the base, the trephine opening should be made near the first point, but about one-half inch lower. After the clot has been scooped out gently, the cavity should be well washed out with freshly boiled water cooled down to blood-heat. If the artery is still bleeding, a semicircular Hagedorn needle armed with catgut should be passed through the dura, under the artery, and out again through the dura on the other side of the artery, and the artery tied. Drainage should be provided and the wound treated antiseptically. A second trephine opening should be immediately made if the first trephine opening does not answer well for drainage in the recumbent posture. (W. W. Keen.)

Subdural Hæmorrhage.—This hæmorrhage generally occurs from the rupture of a number of small vessels, or of one large vessel (especially the middle cerebral), the extravasation being located under the dura mater.

SYMPTOMS.—The symptoms and treatment are very much the same, the differentiation between this and the preceding variety not having yet been made out.

ETIOLOGY.—This hæmorrhage occurs most frequently as a result of depressed fracture. A few cases have been reported as due to pachymeningitis interna, which cases should be treated by trephining, evacuation, and drainage.

PATHOLOGY.—The patient often dies from direct injury to the brain. If he

recovers, the clot, having produced more or less paralysis, is gradually absorbed, but the brain may not expand to its former position, being permanently depressed, the site of the injury being sometimes occupied by spongy connective tissue, the meshes of which are filled with cerebro-spinal fluid, resembling a series of cysts. The paralysis will gradually lessen and may almost entirely disappear, but, after a period of from a few months up to two or three years, epileptic or other cerebral disturbance may appear and persist throughout life.

TREATMENT.—The treatment is the same as for the preceding variety of hæmorrhage. The anterior trephine opening, already referred to, if enlarged upward and backward, will give access to the middle cerebral arteries, and, if symptoms indicate intracranial hæmorrhage, and no clot is found under the bone on trephining, the dura should be opened and the clot searched for along the fissure of Sylvius, in which the middle cerebral lies. If this artery be the source of hæmorrhage, the bleeding-point must be found and the artery tied. (Keen.)

Cerebral Hæmorrhage. See CEREBRAL HÆMORRHAGE.

Concussion of the Brain. See HEAD, INJURIES OF.

Contusion of the Brain. See HEAD, INJURIES OF.

Compression of the Brain.—This is a not uncommon condition in injuries of the head, arising from various causes. In whatever way this condition is brought about, from the pressure of extravasated blood, of pus or other inflammatory exudate, of a depressed portion of bone from fracture or new growth, or from a foreign body lodged there, the symptoms, although presenting some differences, are, for the most

part, constant. The patient lies in a state of lethargy, stupor, or coma, more or less completely paralyzed, heavy, insensible, and drowsy, either not responding when addressed or only when spoken to in a loud tone of voice, and perhaps only when violently shaken. The respirations are slow and deep, with stertor or snoring, and usually a peculiar blowing sound. Paralysis of the velum palati, which, hanging down as a curtain, is thrown into vibrations during expiration, seems to cause the stertor; the distension of the cheeks and the blowing sound are due to muscular paralysis of the lips and cheeks. The pulse is full and often slow; one or both pupils are dilated; paralysis of the sphincter ani causes involuntary evacuation of the fæces, and paralysis of the bladder generally causes retention of the urine; the skin may be cool, but is, in many cases, rather warm and covered with perspiration. Frequently the condition of stupor alternates with paroxysms of delirium or of local convulsive action. This condition of coma may become complicated by the appearance of symptoms of inflammation. Unless the cause that produces the compression is removed, death quickly follows, the coma deepening and the patient dying in an apoplectic condition. In rare cases, the coma may continue for many weeks or months, until the cause of compression is removed, when consciousness will return and the symptoms suddenly disappear. The treatment of this condition is obvious.

Wounds of the Brain.—These are produced by severe blows or falls; by kicks; by the penetration of knives, swords, bayonets, rifle-balls, etc.; by sharp spicula of depressed fractures, and by *contrecoup* with or without fracture. These wounds may be received on sides

or vault of the cranium or through the mouth, nose, or orbit. These wounds are usually accompanied by fracture of the skull: in many cases punctured fractures of most dangerous character. They are all more or less septic in character, with laceration of the brain-substance, the deposition of foreign bodies (fragments of bone, hair, clothing, bullets, etc.), more or less severe hæmorrhage, and in many cases with loss of brain-substance. More rarely—as in children—the wound may be received through the fontanelle, or in adults through a large parietal opening without accompanying fracture.

SYMPTOMS AND DIAGNOSIS.—The symptoms and results of the wound vary according to the age of the patient, seat, and extent of the injury, septic conditions of the weapon and wound, etc. In some cases the symptoms are very slight and much delayed, but more often are severe and promptly manifested, and are proportionate to the extent of the injury.

If the injury be moderate, headache occurs, with all the symptoms of encephalitis in course, followed by coma and death if not soon relieved. The most valuable symptoms tending toward such relief are the localizing symptoms, which may often reveal a hidden injury. If the injury involve the structures at the base of the brain involving the respiratory tract, immediate death must ensue. If the anterior lobes and upper parts of the hemispheres be injured, but slight symptoms may occur. Twitching of the muscles and epileptiform fits are symptoms of cerebral laceration, and those complicating stertor or alternating with it make the diagnosis clear.

In those cases in which no external wound exists we may suspect laceration if we find that the ordinary signs of

compression or concussion are associated with symptoms that do not ordinarily present themselves in those conditions when uncomplicated, such as contraction of one pupil, dilatation of the other, or an alternation of these states with convulsive twitchings of the limbs, hemiplegia of one side, or paralysis of one arm and the opposite leg, with perhaps involuntary spasmodic movements of the other members (Erichsen). In laceration of the brain without compression the pupils are contracted. When laceration and compression are both present, one pupil may be dilated and the other contracted; or both will be dilated or contracted according to the predominance of the symptoms of compression or of laceration. These irregular symptoms accompanied by much coldness of the surfaces, slow pulse, and depression of vital power indicate cerebral laceration. Paralysis due to a cerebral lesion is always manifested on the opposite side of the body, but not necessarily opposite to that on which the blow was received, as the injury may be from *contrecoup*.

Saccharin diabetes is an occasional consequence of injury to the brain, and the location is usually referred to central part of the medulla oblongata and the floor of the fourth ventricle. Blindness may result from injury to the optic nerves at any part; ptosis and strabismus in different direction result from injury to the third, fourth, or sixth nerve. The seventh nerve most commonly suffers, being not uncommonly torn across in fractures of the petrous portion of the temporal bone, either in its facial or auditory portion, producing either facial paralysis or deafness. Injury to the eighth nerve is rare, and patients rarely survive who give evidence of the lesion. Motor aphasia points to a wound above

and in front of left ear; word-blindness, or apraxia, points to an injury above and behind the ear; hemianopsia indicates a wound of the cuneus; paralysis of face, arm, or leg would point to their respective cortical centres as the seat of injury.

Literature of '97-'98-'99.

A final summary of all the evidence at command in reference to traumatic cerebral œdema serves to confirm the conclusions already advanced: 1. That traumatic cerebral œdema can find no place as a pathological or clinical entity. 2. That it is primarily the inevitable sequence in time of that complex of pathological conditions which we designate contusion. 3. That inasmuch as contusion of the brain and its meninges is most commonly met with as a concomitant lesion to the more macroscopical lesions designated hemorrhage and laceration, the primary seat and extent of its accompanying œdema will be largely fortuitous. 4. That in the rare instances in which the application of a traumatizing force is expended in the production of a local contusion of the brain-cortex or its meninges the brain is of itself abundantly able to rid itself of the œdema through its venous channels. 5. That in the remaining cases in which the contusion is primarily extensive in the cerebrum, or when it affects the cerebellum or bulb, the factors which enter into the mechanism of the production of the œdema are such as to preclude the possibility of operative relief. 6. That contusion can, *per se*, easily cause death. 7. That death in such cases results from anemia of the bulb. J. W. Courtney (Boston Med. and Surg. Jour., Apr. 27, '99).

PROGNOSIS.—The danger of wounds of the brain is greatest and most immediate in injuries of the base, of the pons, and of the crura cerebri; it is least and most remote when the seat of the lesion is in the upper and anterior part of the hemispheres, in some cases there being no positive indication of any

injury when so located. Unless the pons or medulla have been wounded, the patient seldom dies at once. Children often bear extensive injuries to the brain, and even considerable loss of brain-substance without immediate or remote effects of serious nature. As a general rule, the younger the patient, the greater the chance of recovery. The prognosis is usually more favorable in men of the laboring classes.

TREATMENT.—In these injuries to the brain the head should be clean shaved, and the parts should be washed, scrubbed, and cleansed with an antiseptic solution. All foreign bodies on the outside should be washed away or removed with forceps. Foreign bodies, fragments of bone, etc., which have entered the brain should be removed and the depressed bone elevated. Disinfection of the brain-cavity and arrest of hæmorrhage by pressure, hot water, or ligature should follow. The dura should be sutured, if not too much lacerated, missing portions being covered in by a portion of the pericranium. The wound should be drained, rubber tubing being preferable, the flaps of scalp replaced and sutured, and a generous antiseptic dressing applied. If secondary abscess appears, and it should be carefully watched for, the pus should be evacuated as soon as detected.

Gunshot Wounds of the Head.—These injuries may involve the integrity of the scalp, the skull, or the brain. The serious nature of these lesions is not always appreciable at first sight. A glancing shot may have injured apparently the scalp alone, while in reality the skull may have suffered such injury that necrosis of the bone will follow, fracture of the internal table, perhaps with splintering or depression; or even the brain and its membranes may be at once or later

involved. In these injuries the scalp often sloughs extensively, the tissues being devitalized by the “energy” of the ball; perforation or deep penetration is not the only means by which the energy of a projectile is measured, for its disruptive, tissue-destroying powers are of equal importance. In other more serious cases extensive injuries of the brain and skull may result.

Literature of '97-'98-'99.

Experiments on animals have shown that a bullet in its passage through the brain does not leave a smooth track, but that it leaves, behind it, tears which radiate out from it. The gray substance is usually more torn than the white; this suggests that the latter is firmer. Tillmanns (Phila. Med. Jour., May 7, '98).

When gunshot wounds involve the brain they may be either perforating or penetrating; perforating, when the missile passes entirely through the head, and penetrating when the missile enters the brain, but does not emerge. The severity of the injury to brain or skull varies within very wide limits. The wound of exit is always larger than that of entrance; this difference is more marked in the skull than in the soft parts. In a perforating wound of the skull the wound of entrance in the external table may be very small, while the inner table may be severely fractured; at the wound of exit the outer table usually suffers most, and the entire opening will be much larger than the wound of entrance. Besides the presence of the missile, there may be fragments of hair, bone, etc., present along the tract of the wound, and more or less hæmorrhage and infection as explained in **WOUNDS OF THE BRAIN.**

The symptoms are similar to those given under **WOUNDS OF THE BRAIN**

and FRACTURES. Localizing symptoms, however, may be absent more or less completely, owing to the far-reaching effects of this class of injuries.

TREATMENT.—In many cases rigid protection of the wound against infection may render further interference unnecessary. Balls and bullets often become encysted. If operation be determined upon, the entire scalp should be shaved and disinfected (see TECHNIQUE OF INTRACRANIAL SURGERY in this article). The entire track of the wound should be disinfected from entrance to exit or to the certain or probable site of the ball. If any serious hæmorrhage be present, the wound of entrance or the wound of exit or both must be freely enlarged with the rongeur forceps or the trephine, and the vessels secured by ligature, by pressure, or with hæmostatic forceps. The bullet or missile must be removed if possible, a counter-opening being made, if necessary, for this purpose. Secure free drainage; if need be, by a counter-opening; the drainage-tube may, for this purpose, have to traverse the entire brain. Antiseptic dressings should be applied, and treatment continued upon the general principles involved in cerebral surgery. The above line of treatment is that advised by Keen, briefly stated. Several devices have been introduced to facilitate the finding of the bullet, etc. Girdner's "telephone probe" is an ingenious instrument in which one end of the probe is attached to a telephone receiver which may be fastened to the ear. If the probe touches the ball, it will indicate it by a grating sound. If the ball is not over $2\frac{1}{4}$ inches from the surface, Girdner's "induction balance" may also indicate its location, and the counter-opening may be made close to the ball.

Literature of '97-'98-'99.

Thirty-two observed cases in which the bullet had been allowed to remain *in situ*. Eight of these died shortly after the lesion with progressive brain symptoms. Two died at a later stage, of abscess in the frontal lobe; and two others, of purulent meningitis. One case was lost sight of. The remaining nineteen recovered; they either presented no symptoms or were unconscious for a short time and suffered later from localized paralysis or cramps. In a limited number there was paralysis on the opposite side of one hand or arm, with subsequent contracture. In the group of cases which recovered with cerebral symptoms, there can be no doubt that the bullet had traversed and destroyed brain-tissue, and had become capsulated. That such capsulation can take place is proved by the Roentgen photographs. Von Bergman (Berl. klin. Woch., May 2, '98).

Morgan, of Indianapolis, has devised what he calls a "trajector" for determining the course of a bullet in gunshot wounds of the skull. It is composed of a solid steel bow (*A*) in the end of which is a movable rod (*BF*). The opposite end of the bow is supplied with a triangular groove (*C*) on its under surface, so that it will adjust itself to the searching probe (*E*). The probe is allowed to gravitate along the track of the bullet until it is arrested; the groove of the trajector is then applied to the probe, and the movable rod on the other end is moved in until it comes in contact with the skull (*F*). This will represent the point where the bullet impinged upon the skull opposite the point of entrance, in case it has passed through the brain, and therefore the point for counter-trephining.

Fluhrer's aluminium probe consists of an aluminium shaft, 12 inches long, tipped with large conical ends of various sizes. It is so light that when allowed

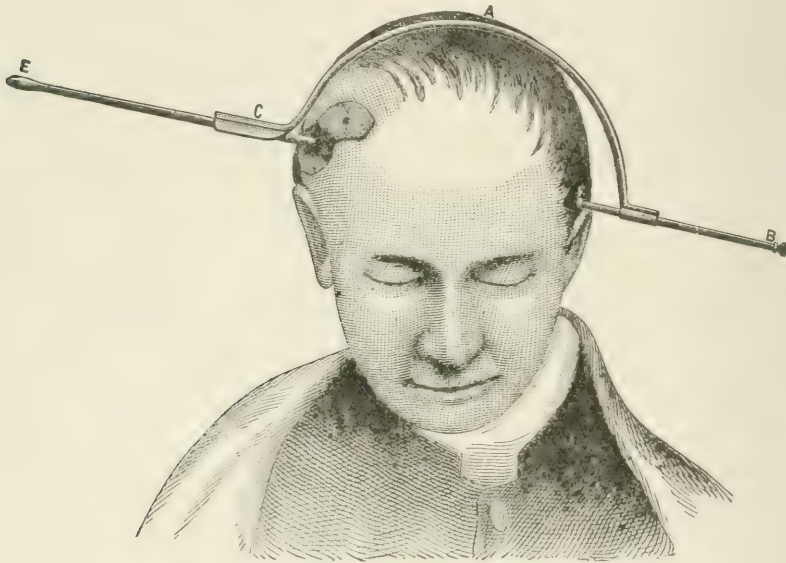
to enter the track of the ball vertically, it will do so by its own weight and will not make a false passage.

Finally, the value of the Roentgen rays, or x-rays, must not be forgotten. A series of sciagraphs may be taken, different portions of the skull being exposed in succession. Reid's base-line marked by a piece of lead wire will show in the sciagraphs.

In regard to probing the brain, there can be no excuse for thrusting a probe

and will answer for small rifle-balls; but both should be porcelain tipped, and be carried by a small aluminium shaft, to give least possible weight to probe and least lateral friction to collapsed canal. Ruth (Jour. Amer. Med. Assoc., Aug. 20, '92).

An instrument personally invented for locating bullets in the brain is called the graduated-pressure probe. It consists of a slender stem insulated with rubber to prevent errors from contact with portions other than the tip. The stem has a bulbous tip to follow track of bullet



Morgan's trajector. (*Indiana Medical Journal*.)

in any direction through normal tissue in the search for a ball. If the probe be of proper size and shape, it will give a definite and readily appreciable resistance before making a false passage. An hemispherically-tipped probe, of $\frac{1}{4}$ -inch diameter, requires from $2\frac{1}{2}$ to 3 ounces weight to produce penetration and $1\frac{3}{4}$ to 2 ounces to cause it to pass between the convolutions. This size tip sufficient to follow up any ball from 32 calibre upward, with a resistance to penetration that a very unskilled touch ought to appreciate. A $\frac{3}{16}$ -inch probe requires from 1 to 2 ounces of weight to cause penetration of sulci or cerebral tissue,

from 22 calibre upward. The handle, of hard rubber, is hollow and slides upon the stem against the pressure of a spiral spring. An indicator upon the stem, and a scale, marked in fractions of an ounce, upon the handle, record the force exerted. The probe is used in the horizontal position. G. R. Fowler (*Annals of Surg.*, Nov., '95).

Literature of '97-'98-'99.

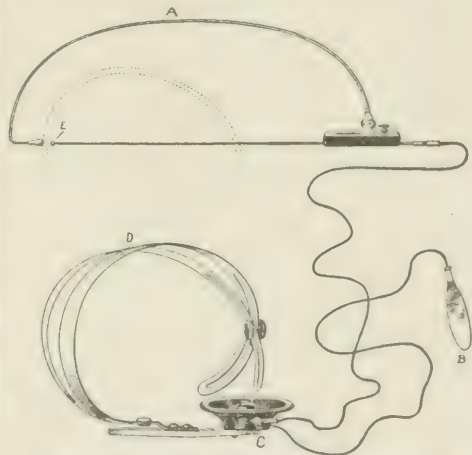
As a method of precise localization and measurement by means of Roentgen rays, the following procedure is laid down: Two wires at right angles to each other are placed upon the photo-

graphic plate, film, or paper. The Crookes tube is then placed with its anode at a measured distance from the plate and exactly perpendicularly to where the wires cross. The tube is fixed in a holder which slides in one plane. Further, one of the cross wires must be in exactly the same plane as that in which the tube is to be displaced. The wires being painted over with some pigment, the part to be photographed is placed on the plate, and carries with it a mark of the cross wires. The tube is then displaced to a measured distance to one side of the perpendicular and an exposure given, then to a corresponding point on the other side of the perpendicular and another similar exposure given. The resulting negative shows double images from the two different points of view. A further precaution is necessary, viz.: to mark one quadrant of the plate and the corresponding quadrant on the patient's skin.

The negative—having been developed, fixed, and slightly washed—is at once placed on a horizontal stage illuminated from below by a suitable reflector (an arrangement similar to a retoucher's desk). The negative may be placed with the gelatin surface upward, or downward if the glass is not too thick. In the case of celluloid films it is most convenient to place them downward. The negative is adjusted so that a perpendicular dropped from a notch in a horizontal scale falls upon the point where the shadows of the wires cross. On each side of it another notch is made at the exact distance and height that the anode of the Crookes tube occupied in the two exposures. A fine silk thread is then passed through each lateral notch, and a small leaden counterpoise is attached to one end of each thread, while the other is passed through the eye of a fine needle. The needle is weighted with lead so that its eye lies flat on the surface of the negative. In short, these two silk threads represent the path of the x-rays, so that if each needle be carefully placed upon a corresponding point in each shadow it follows that the point where these threads cross marks the position occupied by the cor-

responding part of the actual object. Further, its distance can be measured perpendicularly from three planes—from the horizontal which gives its depth, and from the two planes represented by the shadows of the cross-wires. By measuring any other desired corresponding points the precise size, position, and direction of the object can be determined, and remembering that the cross-wires have left their mark on the patient's skin we can at once from these data give the surgeon all the information he can possibly desire. James Mackenzie and W. S. Hedley (*Lancet*, Oct. 16, '97).

F. G. Winter, of Brooklyn, has devised an instrument which combines the prin-



Winter's apparatus for locating bullets.

ciples of Morgan's trajector, Fowler's pressure probe, and Girdner's telephone probe. The trajector consists of a solid bow of aluminium with bulbous tip on the distal end; the proximal pole is hinged to a small steel plate, which is rabbeted to fit a groove on the sliding handle of the pressure-gauge probe. The portion of stem of probe projecting beyond handle is for attachment of the telephonic apparatus. Instead of hand-receiver, a head-receiver may be used, leaving both hands free. (Girdner's telephonic apparatus consists of receiver,

conducting wires, bullet probe, and mouth-piece.)

Wounds of the Sinuses of the Brain.

—The superior longitudinal or the lateral sinuses are occasionally injured during the course of operations, but more often in cases of severe fracture of the skull, usually of the compound variety. When a sinus is injured the extravasation of blood is so rapid and copious that the patient may die in a few minutes from shock, as rapid loss of blood from the brain is more fatal than a like loss in other situations. Hence the necessity for great care when operations are made in the neighborhood of the sinuses. In using the trephine the edge of the instrument should be placed at a perfectly safe distance. The dura may be separated and the sinus entirely detached from the skull by using the dural separator, or a grooved director or probe, and then the finger. The rongeur forceps may then be safely used to enlarge the opening made by the trephine. If incision or exsection of a portion of the sinus is necessary, the sinus may be exposed and ligated on both sides of the proposed incision or exsection. If the sinus be opened accidentally during operation or by fracture, lateral ligature and suture of the sinus may be employed: instant packing with iodoform gauze will, however, arrest such hæmorrhage. It has also been suggested that the margins of the wound be secured by one or more pairs of hæmostatic forceps, which may be removed on the second or third day.

Foreign Bodies in the Brain.—As the result of traumatism, bullets, knife-blades, arrow-heads, umbrella-ferrules, nails, wire, splinters of wood, pipe-stems, fragments of bone, clothing, hair, etc., have been found lodged within the cerebral substance. The symptoms caused

by the presence of foreign bodies in the brain are treated of in **WOUNDS OF THE BRAIN** and **GUNSHOT WOUNDS**. The following course of treatment is advised: Gentle probing or the Roentgen rays to detect the presence and location of the foreign body, no force being used. Remove the fragments about the wound of entrance and thoroughly disinfect the latter. Avoid prolonged and elaborate search should the bullet or other foreign body be not readily found. Employ drainage and dress antiseptically. If there be any bleeding, this can be controlled by a tampon of iodoform gauze, which will at the same time assist the drainage. After applying the antiseptic dressing apply cold to the head. If symptoms of encephalitis develop and are not controlled by careful irrigation and dressing, open the jugular vein and bleed the patient. Absolute rest and quiet should be insisted upon. The diet should be light and nutritious, stimulants being added, if necessary.

Fungus, or Hernia, Cerebri.—When a laceration of the brain and dura mater communicates with a fracture of the skull, it is usually found, especially in children, that a dark-brown or bloody fungous-looking mass of cerebral matter protrudes from the wound. This protrusion takes place at any time—a few days to several weeks—after the receipt of the injury. It has been noticed by Guthrie, and confirmed by others, that hernia cerebri is more likely to take place through small than large apertures in the cranial bones. After its appearance the tumor increases quite rapidly to the size of a hen's egg, or even larger, and pulsates synchronously with the brain. In composition and structure it varies. Sometimes it is composed chiefly, if not entirely, of extravasated blood; but the true fungus cerebri

consists generally of connective-tissue growth (neuroglia), rarely containing much true brain-substance, but may consist of softened and disintegrated cerebral matter, infiltrated with lymph and blood. Under the base of the tumor the softening and red discoloration of the brain extend for some little distance. There may be more or less discharge from the fungus, and escape of cerebro-spinal fluid from the interior of the ventricles. It is apt to bleed.

In this affection the mental condition of the patient may not be much disturbed at first, although there is generally evidence of cerebral irritation. In many cases stupor speedily comes on, however, and death eventually occurs from encephalitis followed by coma consequent upon the development and increase of intracranial inflammatory effusion. In other cases cicatrization of the surface, with retraction of the tumor, takes place and recovery follows.

As a prophylactic measure the suggestion made by Keen may be carried out, that whenever removal of the dura or brain-substance is rendered necessary during the course of operation, a piece of the pericranium should be entirely detached from the under surface of the scalp-flap, turned upside down so that the osteogenetic surface shall be uppermost, and secured to the dura by a few interrupted sutures.

TREATMENT.—The treatment of this condition is not entirely satisfactory. If the tumor be cut off by the knife or destroyed by the cautery, it generally sprouts out anew, though in rare instances removal has not been followed by reproduction. The best results generally follow the use of antiseptic dressings changed once or twice daily, healing taking place by granulation. If it heals slowly, skin-grafting may be re-

sorted to. As soon as cicatrization has been completed there is a sudden subsidence, so that, in the place of a bulging mass, there is a marked depression, which is permanent, and may amount to as much as one and a half inches. Pressure by dressings or sponges, though sometimes useful, must be abandoned if followed by symptoms of intracranial pressure or by convulsions.

Literature of '97-'98-'99.

Daily irrigations with hydrogen dioxide and dressings of iodoform gauze, with systematic compression, used in case of *hernia cerebri*. Diminution in size noticed after first week. At end of ten weeks no evidence of any abnormal growth. T. S. McMullan (*Med. Rec.*, Aug. 27, '98).

Surgery of the Lateral Ventricles.—

A number of cases have been reported in which the lateral ventricles have been opened by injury, 5 cases from simple cranial fracture occurring in children, of whom 3 recovered. There are also recorded 7 cases of compound fracture with injury of the ventricles, 4 of which recovered, and 2 cases of primary rupture of the ventricles by compound fracture, both of which recovered. In *fungus cerebri* a communication with the lateral ventricles is sometimes established, manifested by a continuous flow of cerebro-spinal fluid therefrom, in which recovery has followed. Moreover, Keen has shown that puncture of the lateral ventricles through the brain-substance can be done accurately, and that a drainage-tube may be introduced into the ventricles and remain several weeks without inducing encephalitis or meningitis, and that even irrigation of the ventricles from side to side after bilateral trephining can be done without discomfort to the patient. From these facts it follows that in cranial fractures

involving the ventricles we should not consider the accident as necessarily fatal, but should employ the same anti-septic precaution methods and treatment as though the ventricles had not been involved, and with a reasonable hope of recovery.

If the ventricles are to be tapped, Keen advises the lateral route. A half-inch trephine opening should be made one and one-quarter inches behind the external auditory meatus and the same distance above Reid's base-line (an imaginary straight line drawn through the lower edge of the orbit and the meatus auditorius externus). Then the grooved director or a small tube (calibre No. 5 of French catheter scale, or a little larger) should be thrust carefully and steadily into the brain in the direction of a point $2\frac{1}{2}$ to 3 inches above the opposite meatus. If the lateral ventricle be of normal dimensions, says Keen, it will be reached at a depth of 2 to $2\frac{1}{4}$ inches, but if distended it will be reached at a less depth. The entry into the ventricle will be recognized by the instantly diminished resistance and by the escape of cerebro-spinal fluid, also. Drainage, either by inserting a small bundle of horse-hair doubled like a hair-pin, with the rounded ends inserted first, and passed through the tube, or by carrying a rubber drainage-tube of the same size into the ventricles. Asepsis must be absolute, or the result will be necessarily fatal.

This operation has been done for the relief of acute hydrocephalus with promising results (Mayo Robson reports a cure); in chronic hydrocephalus several operations have been made, but without success. Further reports will determine the value of this operation.

C. SUMNER WITHERSTINE,

Philadelphia.

WOUNDS AND INJURIES OF THORAX AND THORACIC VISCERA.

I. Mural Injuries.

Contusion of the Chest.—The discrepancy often observed between cause and effect in the matter of contusions of the chest is only one degree less notable than in the case of abdominal or cerebral contusions. Given an individual case, it is impossible to predict, with any degree of certainty, in what degree the symptoms resulting from the blow, fall, or crush will be, simply those of a local contusion, or those of shock or concussion. Compare, for example, the immediate death of a well-trained pugilist from a blow "over the heart" delivered in a friendly bout, with Paré's case: a child whose chest was run over by a "carriage containing five men," without even producing a fracture. It is therefore necessary to accept the clinical picture of each case as it occurs and to strive to differentiate the symptoms of shock—the effects of which may be severe, but are usually transient—from those of injury to the viscera; and more especially to recognize injuries to the viscera which may be overshadowed by severe shock, or disguised by the mildness of the symptoms.

Literature of '97-'98-'99.

Case of a young man, 28 years of age, of vigorous constitution, who received a severe fall from a bicycle. At the time he was going at good speed, and some portion of the tubing, probably the handle-bar, came violently in contact with the chest. The skin was not torn, but there was a slight depression as though the costal cartilage had been fractured. At the post-mortem examination there was found some laceration of the intercostal muscle; the pericardium was intact, but was distended with dry, clotted blood. Examination showed a transverse rent at the apex of the right ventricle, extending through its wall.

Rupture of the heart, with contusion, without penetration of the chest-wall, is a rare accident. A collection made by Cecil Robinson, in 1897, showed a total of twenty-two cases. R. C. Newton (Med. Rec., June 17, '99).

The LOCAL, SUPERFICIAL SYMPTOMS of contusion of the chest are unimportant. The comparatively slight hæmatoma and comparatively severe and prolonged soreness alone deserve mention. This soreness may combine with the patient's fright to produce an alarming, but temporary, dyspnœa, and it may, in the middle aged, drag on for months as a pain of rheumatic or neuralgic type.

The SYMPTOMS OF SHOCK are present to a greater or less degree in almost all cases. The pallor, weakness, syncope, or temporary intellectual confusion, and so forth, are not peculiar to thoracic injuries. Yet what might be termed "local shock"—shock to the heart, namely—may seriously interfere with the action of that organ, even proving fatal, as in the case cited, without causing any appreciable lesion.

The SYMPTOMS OF "INTERNAL" INJURY are so bound up, clinically, with the symptoms of simple contusion that they deserve some notice here. Whenever a patient receives an injury to his thorax sufficient to disable him for the time being, he should be kept in bed and his symptoms, as well as the physical signs of his lungs, carefully noted for several days until the physician feels assured that no pleurisy or bronchitis will develop as a result of the injury. To discharge a patient as cured and to have him return, or worse still, apply elsewhere, with a chest full of serum, is not delightful. Needless to say, the patient—whether conscious or not—should be immediately examined for signs of injury to the heart or lungs and fracture of the ribs or sternum.

PROGNOSIS.—The prognosis of uncomplicated superficial thoracic contusion is entirely favorable. Recovery is rapid in the young, tedious in the old and rheumatic. Yet, clinically speaking, the prognosis must always be guarded until the passage of three or four days without evidence of internal injury confirms the diagnosis.

TREATMENT.—Slight contusions may be treated by the adhesive-plaster splint, applied as for fracture, or massage with alcohol, witch-hazel, or chloroform liniment, according to the fancy of the physician.

Severe contusions, if the symptoms of shock are marked, require active stimulation by external heat, strychnine, whisky, enemata, etc., and absolute quiet. Morphine is a specific in such cases, by relieving pain, quieting the mind, stimulating the heart, and slowing respiration. The patient should be moved and handled with the utmost gentleness, so as not to aggravate possible internal injuries, the existence of which cannot be ruled out with certainty during the first hours. If the patient responds to the stimulation recovery is quite rapid, unless there are internal injuries. The usual rules of diet, catharsis, and diuresis carry the patient through his convalescence. The lungs and heart must be examined at least every other day until the patient is discharged.

Fractures and Dislocations.—The fractures and dislocations of the various bones of the thorax have already been described (see FRACTURES AND DISLOCATIONS). They are of importance in this connection from a negative point of view: because, like fractures of the skull, their relation to injury of the contained viscera is by no means constant. The significance of fracture of the ribs—

the usual osseous lesion—is commonly overestimated. A surprisingly small percentage of those whose ribs are broken suffer any visceral injury, while an astonishingly large proportion of those who suffer more or less serious, even fatal, rupture of the lungs or heart show no lesion of the thoracic cage whatever. Thus, among Fischer's 76 cases of rupture of the heart, 32 showed no evidence of fracture. The explanation of this apparent paradox lies in the great elasticity of the thorax, especially in the young (it decreases with advancing age). Weisserer claims that up to the age of twenty-five the sternum can be pressed back to touch the vertebral column without injury to the ribs. Thus in the young, in those, namely, who are exposed to the greatest number of injuries, the force is transmitted through the bones to the viscera, while in the adult and aged the bones are more likely to break.

Literature of '97-'98-'99.

An interesting comparison has been personally made between man and other animals in respect to the shape of the thorax in determining the effect of direct and indirect force in producing fractures of the ribs. The conclusion is that the lesser curve of the ribs with increased strength in quadrupeds is a factor of safety greater than the greater curve and increased elasticity in man. Still, the ribs of quadrupeds may be broken by both direct and indirect violence, while in man indirect force more often leads to fracture, the ribs only being driven in at the place struck, the fracture occurring a little way off. It is thought that this explains the comparative absence of injuries to the deeper-lying structures, such as would naturally be expected to occur, from direct violence. E. M. Corner (*Lancet*, Jan. 7, '99).

Yet it cannot be denied that a fragment of bone, whether detached or only

momentarily depressed, is often the immediate cause of visceral rupture. But these cases differ clinically in no way from those in which there is no fracture, excepting rupture of the pleura.

RUPTURE OF THE PLEURA is the only complication of fracture essentially due to the fracture. By rupture of the pleura is meant rupture of its parietal leaf, without rupture of the visceral pleura or the underlying lung. Such a rupture only occurs from a direct tear by the end of a broken rib. When, after an injury, fracture of a rib and hæmothorax can be demonstrated, and hæmoptysis, pneumothorax, and emphysema do not occur, it may be fairly concluded that the hæmothorax is due to rupture of the pleura. The treatment is that of hæmothorax.

Non-penetrating Wounds.—The only importance attached to non-penetrating wounds of the thorax lies in the differential diagnosis. As soon as it is certain that the wound actually is non-penetrating the prognosis and treatment are simply those of flesh wounds elsewhere. In establishing the diagnosis the course to be followed is the same as in contusion, viz.: absolute rest until the integrity of the viscera can be guaranteed.

There is one symptom, a slight emphysema about the wound, which sometimes occurs in wounds of the axilla, that might lead to confusion in the diagnosis, though in reality it is due to suction of the air into the loose axillary fascia by the movements of the arms. But a mere knowledge of the fact suffices to distinguish this emphysema from the emphysema of wounds of the lung.

Probing as a means of diagnosis or treatment is absolutely to be condemned.

TREATMENT.—The non-penetrating wounds of the thorax are to be treated on general surgical principles. Hæmor-

rhage from an intercostal artery was one of the nightmares of ancient surgery. It may be controlled by clamp or pressure, and the surgeon need not hesitate to enlarge the wound for this purpose.

II. Injuries of the Thoracic Viscera.

Injuries of the Pleura.—Injury to the vesical pleura is a feature of injury of the lung, which clinically always accompanies it. Injury to the parietal pleura may be subdivided into:—

1. Rupture by a fractured rib (see above).

2. Wounds of the pleura.

WOUNDS OF THE PLEURA.—Perforations of the pleura containing fluid have been recorded as curiosities of surgery. Such an accidental paracentesis has a romantic rather than a scientific interest.

Puncture or incision of one layer of the pleura without injury to the other is, as may well be imagined, an unusual occurrence, and perhaps it might be more correct to speak of wounds of the pleura with a corresponding lesion in the lung too slight to produce symptoms. Be that as it may, cases do occur which give evidence of injury to the parietal pleura alone.

When the wound is so small as not to admit the entrance of any air the condition is practically a rupture of the pleura, and the consequent hæmothorax is the sole evidence that the pleura has been damaged.

In the majority of cases, however, the wound is large enough to allow the normal suction, the "vacuum" of the pleural cavity, to draw in the outside air, and thus to produce a pneumothorax or a pneumohæmothorax. Such a case differs from a wound of the lung only in the absence of hæmoptysis. If the wound is larger still, the uninjured lung may be seen fluttering wildly about, or a hernia of the lung may occur.

It is probable that the secondary pleurisy with effusion, which so often complicates a contusion or wound of the thorax, however slight, is due to some puncture, rupture, or contusion of the pleura, but what the exact nature of the lesion may be it is impossible to say.

The diagnosis between an injury to the pleura alone and one to the lung is generally unnecessary, often impossible.

The prognosis and treatment are along the same lines as those of pulmonary injuries.

Literature of '97-'98-'99.

Case of perforating wound of the liver, kidney, diaphragm, and pleura. The patient, while riding a bicycle, was struck by the shaft of a rapidly-moving wagon, which first penetrated the right arm, separating the biceps and vessels from the humerus, and then forced its way into the chest, breaking the tenth rib, tore through the diaphragm and liver, and finally caught the right kidney against the spine, and cut its upper third almost completely from the lower two-thirds. After an interval of seven hours the fractured portion of ribs was resected. About a quart of effused blood mixed with bile and also, it was thought, with urine, was removed from the pleural cavity, and then the abdominal cavity was exposed with the hand passed through the wound in the diaphragm. A tight iodoform-gauze packing was then begun through the pleural wound, beginning at the kidney, and continued up through the liver and chest-wall, where the former had been torn away. This packing was brought up through the diaphragm and out of the wound in the wall of the chest. The patient remained in a critical condition for a month from the date of injury, during which time the liver seemed to discharge almost the whole of its bile, mixed with the urine from the injured kidney, through the wound. Subsequently the patient made a speedy recovery, and at the end of six months had nearly regained his normal health. Abbe (*Annals of Surg.*, Apr., '99).

Rupture of the Lung.

SYMPTOMS.—The evidence of pulmonary rupture may be more or less marked.

I. When the lung is only slightly torn or contused, a small hæmoptysis may be the only sign added to the evidences of superficial contusion. There may be a few fine râles at the point of injury, or a circumscribed area of dullness, with little alteration of voice and breathing. In other cases these initial signs pass unnoticed, and the first evidence that the lung has been injured is a pleurisy with effusion, a bronchitis, or a broncho-pneumonia (see Section V of this article).

II. When the pulmonary laceration is extensive there is immediate hæmorrhage into the bronchi, and hæmoptysis is instant and copious. The shock is severe and the patient in collapse, with thready pulse, labored and irregular breathing, and subnormal temperature. Physical examination of the injured lung reveals evidences of pneumohæmothorax (see below).

During the first twenty-four hours the patient may die of shock, loss of blood, or by drowning in his own blood, which fills the trachea and may even run into the bronchi of the uninjured lung. That shock is always severe is explained by the number of agencies at work to cause it: there is the "molecular disturbance" of the trauma, the profuse internal hæmorrhage, and—most of all—the shock of sudden pneumothorax, which arrests the functions of one lung almost instantaneously, and, at the same time, disturbing the normal thoracic tension, seriously hampers the action of the other lung and the heart.

If the patient survives a few hours, subcutaneous emphysema begins to appear at the base of the neck, or, if the parietal pleura is torn by a broken rib,

at the site of injury (see below, EMPHYSEMA).

Associated injuries may prevent a given case from conforming closely to the type; but the elements of the picture—hæmoptysis, pneumohæmothorax, and secondary emphysema—cannot be obscured.

The course of the case, after the first shock has been passed, is that of a pneumothorax, with a marked tendency to secondary inflammations of the lung and pleura (see COMPLICATIONS).

ETIOLOGY.—Accurately speaking, rupture of the lung is the bursting of that organ by a compressing force, but clinically this true rupture is indistinguishable from laceration of the lung by a fractured rib (see above). In the majority of cases the ribs are broken. Less often they remain intact. The accepted explanation of rupture of the lung under these circumstances is that of Gosselin: the patient, foreseeing his danger, instinctively catches his breath, thus presenting a tense lung, which breaks readily under a crushing force. Yet this theory does not apply to all cases, notably those who are unconscious when injured, nor need it be invoked in any case. Doubtless a distended lung is more easily torn than an empty one; but the fundamental fact is that when any part of the lung is suddenly compressed, not only is it contused as any other soft part would be, but the circumference of the lung, closely adherent to the chest-wall by virtue of the pleural vacuum, is torn directly at the point of impact or indirectly at some other point, quite as a paper bag distended with air (though the lung is distended by suction from without rather than by pressure from within) is torn by a blow of the fist.

In point of fact, rupture of the lung

is usually caused by a severe crushing force, such as a fall from a height, the fall of a rider under his horse, a fall under the wheels of a wagon, or the kick of a horse.

PATHOLOGY.—By extensive rupture of the lung-tissue an artificial cavity is formed, connecting the pleural cavity, the bronchi, and the torn blood-vessels, thus establishing pneumohæmothorax. Lesser ruptures form small hæmatomas or ecchymoses, like contusions of any soft part. If the healing is not interfered with by infection or a large hæmatoma, it is complete within a few days. Autopsy has shown complete healing of small lacerations within a week.

PROGNOSIS.—The prognosis depends on the reaction of the vital forces of the individual to the injury received, and, hence, given individuals of the same age, habits, and constitution, the less the injury, the brighter the prognosis. Yet in any case of injury to the lung, however slight, the prognosis must be guarded until the lapse of time has proved that the secondary complications are not to be feared (see Section V of this article).

TREATMENT.—The treatment at the time of accident is the same as that of severe superficial contusions of the chest (which see): stimulants, morphine, physical rest, and external heat.

The subsequent treatment is that of the primary and secondary complications, and is reviewed in Sections III, IV, and V.

Wounds of the Lung.

SYMPTOMS.—Wounds of the lung present the combined features, already detailed, of rupture of the lung and wound of the pleura. The smaller the wound, the more its clinical picture resembles that of simple rupture of the lung. The larger the external wound, the more it

resembles a simple wound of the pleura. Air and blood intermingle in the pleural cavity from the lung and from the parietal wound. If the latter is small or tortuous, the air from the pleural cavity may infiltrate along the fascial planes about the wound (see Section III). while, if the external wound is large, instead of this subcutaneous emphysema there is "traumatopnœa": a rush of air in and out of the wound each time the patient breathes.

The subsequent course of a wound of the lung is quite that of a ruptured lung; but added to the danger of hæmorrhage and sepsis from within is the danger of hæmorrhage and sepsis from without.

TREATMENT.—The treatment of a laceration of the lung and its consequences are considered elsewhere (see RUPTURE OF THE LUNG).

The added dangers, sepsis and hæmorrhage from the parietes, require local therapeutics. On seeing the patient the surgeon's first efforts are directed to insuring his rest and stimulation, and at the same time he treats the wound in the thoracic wall as an ordinary surgical wound, endeavoring to obtain asepsis by the removal of foreign bodies and copious irrigations with sterile solutions, and hæmostasis by pressure or ligature.

As regards asepsis, it must be remembered that under ordinary circumstances all endeavors to attain it shall stop short at the parietal wound and respect the pleural cavity, for irrigation of the latter is calculated to do more harm by increasing the shock and renewing or encouraging the internal bleeding than it can possibly do good. For the same reason the solutions used to wash the wound should be simply aseptic, and not antiseptic, so that the portion of them which is lost within the thorax may not be irritating.

As to hæmorrhage, patients have died of bleeding from a wounded intercostal or internal mammary artery. Hence the surgeon should not be satisfied until he is absolutely certain that all parietal hæmorrhage is checked.

Whether or not the wound shall be sutured at once is not always easy to decide, but the rule is to suture if possible, and to exercise especial care in obtaining apposition of the deeper structures so as to prevent any extensive emphysema about the wound.

The treatment of hernia of the lung, etc., is referred to in another section.

BULLET WOUNDS OF THE LUNG.—Bullets make small, perforating wounds in the lung. The looseness of the tissue prevents their having any explosive effect. They usually cause death by hæmorrhage, and they form a large percentage of the foreign bodies of the lung.

Rupture of the Heart and Pericardium.—The so-called "spontaneous" rupture of the heart is, like a "spontaneous" fracture, the rupture of a diseased organ by a very slight trauma. The usual causes of spontaneous rupture of the heart are myocarditis, the predisposing cause, and a violent contraction of the heart due to a shock, such as fright, or to great muscular effort.

The usual cause of rupture of the heart is a heavy blow over the sternum. The bones are unbroken in 42 per cent. of the cases (Fischer). In 5 of 76 cases the heart alone was ruptured, in 5 others the pericardium alone. The rupture is very rarely incomplete.

Rupture of the heart has been personally seen but 3 times in 8000 autopsies. Kouskoff (*La Presse Méd.*, Mar. 18, '96).

SYMPTOMS.—The usual symptoms are collapse and immediate death. If death

is not immediate, the diagnosis may be made by the evidences of irregular heart-action and fluid in the pericardium. Of the 7 cases reported by Fischer as having recovered, in only 1 was the diagnosis confirmed by subsequent autopsy.

It is important from a medico-legal point of view to remember that death is not always instantaneous in rupture of the heart. T. N. Kelynaek (*Lancet*, July 18, '96).

TREATMENT.—See WOUNDS OF THE HEART.

Wounds of the Heart and Pericardium.—Practically all wounds of the heart are bullet and stab wounds. Lacerations by broken bones are included under rupture of the heart.

Fischer's statistics prove that the most important parts of the heart functionally, the ventricles, are much more liable to wounds than the auricles: 257 wounds of the ventricles, against only 31 of the auricles, which might be expected from the smaller size and less exposed position of the latter. Editorial (*Jour. Amer. Med. Assoc.*, June 13, '96).

SYMPTOMS.—As a rule, a wound of the heart is immediately fatal: the wounded man drops dead incontinently. Yet in a few cases the fatal issue is postponed or averted, and foreign bodies have been found imbedded in the wall of the heart, though they produced no symptoms during life.

The few who escape immediate death are usually found in a condition of collapse: the product of shock and hæmorrhage. But some persons, among whom the late Empress of Austria was a notable example, escape this shock and continue to walk, fight, or go about their various avocations for a few moments or even for a few days or weeks, at the end of which time the heart suddenly stops.

If the patient survives the immediate

shock, examination of the chest reveals the external wound bleeding copiously if in direct communication with the wound in the heart. The area of cardiac dullness is enlarged by an effusion of blood within the pericardium (hæmopericardium), or perhaps obliterated if the pericardium is filled with air (pneumopericardium) from an adjacent wound in the lung and pleura, in which case there is pneumohæmothorax. Auscultation reveals a weak, irregular heart-action and numerous atypical murmurs. A special sound heard with pneumopericardium or pneumohæmothorax in the vicinity of the heart is the "mill-wheel sound." This is a succussion caused by, and synchronous with, the heart's action.

The immediate danger of death is now from hæmorrhage, associated injuries, and from compression, actual smothering, of the heart by the blood in the pericardial sac. Escaping these dangers, fatal embolism, secondary hæmorrhage, and infection are still possible; and, if the patient finally does survive, the heart may be permanently debilitated by pericardial adhesions, cicatrices about the valves, perforation of the interventricular septum, etc.

Fischer, who chronicles 334 wounds of the heart, exclusive of rupture, and 42 of the pericardium alone, records 47 recoveries (14 per cent.) in the former class and 18 (42 per cent.) in the latter. While these figures are misleading as to the proportion of recoveries, they show that recovery is possible.

Literature of '97-'98-'99.

Of 401 cases of wounds of the heart collected by Fischer it was found that recovery had taken place in 50 cases. Several cases have also been recorded where patients have survived for considerable periods with foreign bodies

lodged in the heart. J. Rudis-Jicinsky (N. Y. Med. Jour., Apr. 23, '98).

DIAGNOSIS.—The history and evidence of a wound in the præcordial region, together with marked irregularity of the heart's action and increase in the area of cardiac dullness, or rarely obliteration of it with "mill-wheel" succussion, those, together with severe shock, usually constitute the diagnostic features of a wound of the heart.

Here, even more than in wounds of the lung, the use of the probe is bad surgery. It can reveal nothing that may not be discovered in some other way, and it may kill the patient.

PATHOLOGY.—When instantaneous death follows a wound of the heart it is probably due to the shock inflicted on the automatic heart-muscle and its contained ganglia, in response to which it stops instantly.

The aseptic healing of a wound in the heart requires a week. The blood effused in the pericardium may become infected or be absorbed, leaving an adhesive pericarditis.

The bullet wounds of the modern rifle have a special pathology. If they so much as graze the heart they impart to its fluid contents such a rapid vibration as to burst the organ asunder.

TREATMENT.—Up to within a few years the treatment of lesions of the heart has been similar to that of injuries of the lung, supporting and expectant; but the accumulated evidence in favor of paracentesis pericardii has at last emboldened the surgeon to attack the heart itself.

It has been proved that a large proportion of those who survive an injury to the heart a few hours or days die either from loss of blood or compression of the heart by the blood effused within the pericardium. Theoretically either

of these dangers can only be met by an operation, and practically a very fair number of successful operations bids us hope that in the future a satisfactory percentage of successes may be reported. At present it does not seem justifiable to operate except in those rare cases when the patient is evidently failing rapidly and yet not moribund at the time of operation.

The technique is described in Section VI.

The later dangers of infection are met by the routine treatment of septic wounds—drainage, wet dressings, irrigation, etc.—and of suppurative pericarditis, mediastinal abscess, etc., as the case may be.

The causes of immediate death after heart injuries are either nervous or mechanical: first, by interference with the ganglia presiding over the movements of the organ; and, second, by the effusion of blood into the pericardial sac, thus compressing the organ and hindering its action. For the former complication, surgery is of no avail. In the latter, however, it would seem that evacuation of the fluid or clotted blood might be followed in many cases by favorable results. Editorial (*Jour. Amer. Med. Assoc.*, June 13, '96).

Literature of '97-'98-'99.

In hæmopericardium the heart is not displaced backward as stated in the text-books, but lies close to the chest-wall, which is shown by experiments on animals. The left fourth and fifth ribs should be temporarily resected near the mammary line, and the flap turned back upon the sterno-costal joints, which exposes the anterior wall of the right and a large portion of the left ventricles. By resecting the third and fourth ribs and a part of the sternum the right auricle is exposed. Suturing of a cardiac wound is facilitated by drawing upon the pericardium, whereby the heart is brought forward. The right ventricle must be sutured during diastole, the left during

systole. L. Rehn (*Verhand. der Deut. Gesells. f. Chir.*, XXVI Kongress, '97).

The pericardium and heart are not regions where surgical intervention is always contra-indicated. Before intervention is attempted the condition of shock that is generally present must be overcome. This is accomplished by the intravenous injection of physiological serum and other fluids. Intervention should not take place while the heart is weak, and nothing should be done to enfeeble it. Anæsthetics should be avoided or used only in a very slight amount, without full anæsthesia.

The method of intervention is influenced by the form of injury that requires it. If the injury is of the nature of a puncture or prick as by a needle, the foreign body should be removed. If the volume of the foreign body is greater it is better to operate where everything is in sight rather than to trust to the closure of the wound by a contraction as the body is gradually withdrawn. The pericardium and, if necessary, the heart is laid bare, sutures are placed in position, the foreign body removed, and the wound closed immediately by drawing the sutures.

Where an incised wound of the heart is suspected the symptoms must be the guide. Secondary intervention has succeeded in a number of cases, and intervention must be postponed till the symptoms indicate the necessity. The complications to be watched for are hæmorrhage and pericarditis.

In hæmorrhage immediate intervention is never indicated, as spontaneous arrest often cures. Therefore, if the area of pericardial dullness remains stationary and does not increase, expectant treatment is indicated. When, however, there is an aggravation of the general condition, with pallor, weak pulse, syncope, an augmentation of præcordial dullness, weakening of the sounds of the heart, and recurrent external hæmorrhage, intervention is indicated. When possible the track of the wound should be examined before opening the pericardium. Cestau (*Gaz. Heb. de Méd. et de Chir.*, No. 17, '98).

Clinical experience has shown that

wounds of the heart are not so grave as is generally supposed, and that recovery may follow even a wound extending into one of its cavities.

Death in most instances of fatal heart injury is due to hæmorrhage. The most urgent danger, however, in cases of penetrating wounds of the heart, especially those of the ventricles, is shock due not so much to anæmia as to direct irritation and disturbance of the wounded organ. This condition of shock should be treated not by the application of stimulants, but by prompt intervention of the surgeon in enlarging the wound in the pericardium, in removing clots from this sac, in exploring the injured heart, and in closing the wound of its wall by suture. Another but less frequent cause of death in cases of wounded heart is the entry of air into the wound and consequent gaseous embolism.

Surgical intervention is indicated just as much in simple wound of the pericardium as in an injury involving both this membrane and the wall of the heart. The technical difficulties are very great. A flap of the thoracic wall—including the left half of the lower extremity of the sternum and the third, fourth, fifth, and sixth costal cartilage—is personally recommended. Podrez (*Rev. de Chir.*, May, '99).

Ninety cases of wounds of the heart and pericardium, in which the lesion was discovered during operation or at the necropsy, tabulated. In 70 cases death occurred without intervention, 56 from internal hæmorrhage, 12 from infection, and 2 from cerebral hæmorrhage. The nature of the instrument causing the wound is reported in 78 cases; nearly all of them were penetrating wounds from small arms; 48 of them from a knife. The right ventricle was injured in 31 cases, the left ventricle in 26 cases, the right auricle in 6 cases, and the remaining cases were of the left auricle, great vessels, and unclassified. In 45.5 per cent. of the cases there was also a wound of the pleura, and in many of the other cases other organs were injured. Pericardotomy followed by tampon of gauze was practiced in 3 cases, with cures in all. Eight pericardotomies followed by

suture of pericardium were followed with 3 recoveries and 5 deaths. In 5 cases in which wounds of the heart were sutured followed by packing or suture of the pericardium there were 2 cures and 3 deaths, one of them from an independent cause. The time intervening between the accident and death varies from some minutes to several hours. E. Loison (*Revue de Chir.*, Feb. 10, '99).

Foreign Bodies in the Heart.—As a rule, the lodgment of a foreign body in the pericardium or heart, whether by trauma or ulceration, is rapidly and irretrievably fatal. Exceptionally, however, some individual evidences this condition unconsciously for a number of years, and dies of intercurrent disease.

[Beer (*Cincinnati Lancet-Clinic*, xi, 496, '98) reports an autopsy on the body of a veteran of the Civil War who had carried a bullet in the wall of his heart for thirty-seven years without a symptom.

Elmiger (*Allg. Zeits. f. Psych.*, liv, 1101, '98) reports a similar case: a needle found in the heart-wall three years after it was forced into the chest. LEWIS A. STIMSON and EDWARD L. KEYES, JR.]

In general, the prognosis is quite as fatal as for other wounds of the heart.

The heart sometimes tolerates foreign bodies very well, and again a slight injury proves fatal. Among foreign bodies found in this organ, besides bullets and needles, which are the most common, are splinters of wood, fish-bones, etc. Even the ubiquitous hat-pin has been discovered (Laugier). Bullets have been found capsulated in the heart for many years; in the right ventricle six years (Latour); in the wall of the ventricle for twenty years (Balch); and for no less than fifty years in the pericardial sac. It must be observed in passing, however, that these were the old-fashioned round balls; few conical balls will be stopped by the heart, and still fewer, if any, of the most recent projectiles of small calibre and extreme penetration.

The extent of the wound does not seem to bear any decided relation to the

duration of life, for while Steiner's experiments seem to prove that simple puncture by a needle is not very dangerous, yet several cases are on record of immediate death resulting from needle wounds, accidental, homicidal, or otherwise. Again, in the cases where recovery took place the damage was much greater than any that could be inflicted by a needle. In Brugnoli's case the mitral valve was implicated; in Conner's case, one cusp of the aortic valve; yet the patients survived for years. Editorial (Jour. Amer. Med. Assoc., June 13, '96).

Injuries to the Mediastinum and Thoracic Vessels.—Rarely existing alone, these injuries often complicate injuries of the heart or lung, obscuring their symptoms and depressing the prognosis. When the great vessels are injured, immediate and fatal hæmorrhage results. Such later complications as aneurism and mediastinal abscess have been described elsewhere.

Wounds of the thoracic duct, while they prove fatal through leakage of the chyle, are said to heal if the duct is not completely divided on account of the unusual elasticity of its walls.

Literature of '97-'98-'99.

Reports of 9 cases of wounds of the thoracic duct have been collected from literature. Personal case which occurred during a secondary operation for removal of cancerous glands in the neck.

As a rule, the thoracic duct lies beyond the reach of operative injury. The most important anomaly from a surgical stand-point is an arching of the duct high up into the neck.

The treatment of injuries to the thoracic duct occurring during operation, may be summed up as follows:—

"When working near the duct all visible lymphatics should be tied.

"If the duct itself is injured, suture is the ideal method." If this is impossible and the duct wounded seems to be the main branch, a provisional ligature should be applied and the wound tamponed with gauze. If the leakage should

become uncontrollable and threaten starvation, the provisional ligature should be tried. H. W. Cushing (Annals of Surg., June, '98).

III. Primary Complications.

Hæmorrhage.

VARIETIES.—1. *External hæmorrhage.*

—This merits no extended notice. External hæmorrhage, whether slight or profuse, may come from a visceral injury, quite as internal hæmorrhage may come from a parietal vessel.

2. *Internal Hæmorrhage.*—The blood may be effused into (a) the bronchi [causing hæmoptysis], (b) the pleura [hæmothorax], (c) the pericardium [hæmopericardium], and (d) the mediastinum [hæmomediastinum]. Any or all of these manifestations of bleeding may result from a single injury.

SYMPTOMS.—The general symptoms of internal hæmorrhage are the symptoms of a rapid loss of blood plus those of the attendant shock, viz.: collapse, usually syncope, with ever-increasing anæmia and progressive weakening of the pulse, in spite of the most energetic stimulation. To this not overdefinite clinical picture are added, when the hæmorrhage is intrathoracic, certain characteristic physical signs. An *hæmoptysis* is the most frequent, and the most notable evidence. It may be distinguished from hæmatemesis by the presence of râles in the bronchi of the affected lung (perhaps in both), the history of injury to the chest, and the light color of the blood as well as its admixture with air. *Hæmothorax* stands next in importance. It produces the same physical signs as pleurisy with effusion (which see), unless there is a simultaneous irruption of air into the pleural cavity, in which case the signs are those of pneumohæmothorax (see below). *Hæmopericardium* increases the area of

cardiac dullness and interferes with the action of the heart quite as a serous pericarditis does. Finally *hæmomediastinum* produces physical signs similar to those of abscess (see *MEDIASTINUM*).

DIAGNOSIS.—The diagnosis is rarely doubtful. It may always be settled by paracentesis of the pericardium or pleura (see below). But the point of origin of the hæmorrhage may be difficult to determine. On this point a few fundamental rules may be laid down.

1. If there is hæmoptysis, there are usually more râles in the injured lung than in the sound one.

2. If there is hæmothorax or pneumo-hæmothorax without hæmoptysis, the lung is intact and the bleeding parietal usually.

3. Hæmopericardium is no proof that the heart itself is wounded.

4. Never remain in doubt whether there is bleeding in the chest-wall. Be assured by actual inspection that there is no hæmorrhage from an intercostal or an internal mammary artery, even enlarging the flesh wound for that purpose; for death has occurred too often from such hæmorrhage, which may perfectly well be controlled.

ETIOLOGY.—The cause of the great loss of blood is in all cases the same. While clotting is retarded or entirely prevented by the incessant movements of the chest and the organs within it, the blood is actually sucked from the vessel by the aspiration of the intrathoracic tension. The effect of this aspiration is of no great importance when the bleeding is into the pericardium or the mediastinum; but it plays an important rôle in pleural effusions, the tension of the normal lung and the size of the pleural cavity being such that the effusion of blood within it may fill half the thorax before the tension is equalized,

and having gone thus far it is liable to go still farther and compress the heart and the other lung.

COMPLICATIONS.—Infection of the blood-clot is the complication most to be feared.

PROGNOSIS.—Small effusions of blood become encysted and are gradually absorbed, leaving behind them an area of pleura (or pericardium) obliterated by adhesive inflammation. Infection is infrequent. Not so, however, with the more considerable effusions. For these the danger of infection is paramount. It threatens from all sides; from the thoracic wound, from the bronchi (though the smaller bronchi are germ-free), from any inflamed areas in the lung (and inflammation of a lacerated lung is common), possibly from the blood—and the bacteria, once introduced, demand no better culture-medium; hence an empyema of sudden onset (see below). But infection may be averted. Then the blood is slowly absorbed as such. Clotting seems not to occur in the pleura of man.

TREATMENT.—The two therapeutic indications are to stop the bleeding and to prevent infection. The treatment of cardiac hæmorrhage has already been described (see Section II), and the necessity of identifying and checking parietal hæmorrhage has been insisted upon. There remains hæmorrhage from the great vessels and from the lung. For the former nothing can be done beyond keeping the patient absolutely quiet, using morphine liberally to that end, and possibly by the use of gelatin in 1-per-cent. solution hypodermically or in the rectum. For hæmorrhage from the lung the same expectant course is probably the best, though venturesome surgeons would have us cut down upon and pack the visceral wound. To per-

form this operation through an extensive wound in the side is all very well; but to make the wound is asking too much of the patient's strength. If left to itself the lung will continue to bleed until it has completely retracted, unless there are adhesions, and the pleura is full of blood. The tension of the blood in the pleura will then tend to compress the lung, and thus to favor clotting, aided by the syncope into which the patient has fallen. To hasten this syncope by venesection, thereby drawing the blood of a patient who is already bleeding dangerously, is a quaint custom approved by certain English writers. It is safer to wait, though perhaps "splinting" the lung by the injection of air into the pleura might occasionally be beneficial (see below).

The second point, the prevention of infection, is readily attended to. The external wound must be thoroughly irrigated with boiled water, normal salt solution, or even unboiled, clean water, if nothing else is to be had, and sutured tightly in layers, if small; in any case covered with an aseptic dressing. No strong antiseptics may be allowed about the wound, lest they leak into the pleura and there prove irritating.

As the case progresses two indications for drawing off the fluid from the chest may arise,—a progressive rise of temperature, namely, and increasing dyspnoea,—the one indicating infection, the other pressure. Paracentesis, the original wound being left undisturbed, is the best way to meet either indication. If the quantity of fluid is large it should be drawn off, a pint at a time, at several sittings. Moreover the operation should be deferred as much as possible, for within the first eight or ten days there is danger of secondary hæmorrhage if the lung is relieved of the pressure upon it.

When the fluid withdrawn from the pleura contains bacteria no more than temporary relief from infection may be expected, and as soon as the temperature begins to ascend again permanent drainage must be established either by reopening the old wound or making a new one (see *ЕМПЕМА*). But when the fluid is aseptic and the fever continues in spite of paracentesis the inflammation is presumably confined to the lung. Yet it must not be forgotten that empyema may occur even after the pleura has been emptied.

If at the end of twenty days there is still fluid in the pleural cavity paracentesis should be performed.

Pneumothorax.

SYMPTOMS.—The symptoms are quite the same whether the pneumothorax is traumatic or "spontaneous": *i.e.*, caused by the rupture of a tubercular cavity into the pleura. There is a sudden, sharp pain in the chest, followed by collapse, more or less severe. Even though the shock be slight, the respiration and pulse are irregular and feeble. The affected side moves little or not at all with respiration. The heart is displaced toward the sound side. Vocal fremitus is diminished or absent, and the percussion-note usually tympanitic or amphoric. The voice and breathing are cavernous, amphoric, or absent. If the external wound is patent there is "traumatopnœa": *i.e.*, breathing through the wound.

COMPLICATIONS.—Simple pneumothorax is exceedingly rare. There is usually serum, pus, or blood in the pleura as well as the fluid. In traumatic cases the condition is practically always one of hæmopneumothorax. The signs of hæmothorax may be obtained in the lower part of the pleura, the signs of pneumothorax above, and such spe-

cial signs as succussion and metallic tinkle between the two (less clearly in hæmopneumothorax than in hydropneumothorax).

Subcutaneous emphysema is rather an associated condition than a complication.

PATHOLOGY.—Pneumothorax, like hydrothorax, is produced by the elasticity of the lung, which tends to retract upon itself toward its hilum as the air rushes into the pleura. In traumatic cases the pleura is usually free from adhesions and the pneumothorax a complete one, the empty lung being surrounded on all sides by air. The loss of the use of one lung and the upset in the equilibrium of thoracic pressure accounts for the marked disturbance of pulse and breathing.

If the opening into the pleura, whether pulmonary or parietal, heals, the lung expands as the air in the pleural cavity is absorbed. If the opening does not heal, the lung expands more slowly by a species of capillary adhesion to the parietal pleura, aided by the varying intrapulmonary pressure of respiration.

PROGNOSIS.—An uncomplicated pneumothorax usually progresses toward recovery without accident. Death may, however, occur from the initial shock or from the associated hæmothorax, and the favorable progress may be interrupted by the occurrence of subcutaneous emphysema or dyspnoea, indicative of pressure. Suppuration is rare.

TREATMENT.—Pneumothorax usually requires no special treatment. To relieve pressure or to prevent progressive emphysema paracentesis or drainage may be resorted to.

In pneumothorax the importance of respiratory quietude and the advantage of removing the gas under the same cir-

cumstances as one would a liquid effusion are insisted upon. Foxwell (*Brit. Med. Jour.*, Apr. 25, '96).

Literature of '97-'98-'99.

The best treatment of pneumothorax is by means of a tube or cannula with a valve opening only from within outward. By this means air issues only during expiration, and none enters the pleural cavity during inspiration: hence the air is gradually removed. This method of treating pneumothorax is not only safer than thoracentesis, but more efficacious. D'Alessandro (*Gaz. degli Osp. e delle Clin.*, Feb. 7, '97).

Thirteen cases of empyema and pneumothorax treated by permanent drainage. Five cases were cured, 6 died, and 2, the latter tuberculous, improved, but subsequently showed amyloid degeneration. The appearance of fetid pus requires immediate thoracotomy. Permanent drainage is most valuable in recent cases, though it is often successful in the latter forms. K. Pitchler (*Deut. Arch. f. klin. Med.*, Dec. 22, '97).

Subcutaneous Emphysema.—Subcutaneous emphysema appears as an ill-defined cedematous swelling which pits under pressure, imparting to the finger a fine crackling sensation.

After rupture of the lung it rarely appears unless there is pneumothorax. The emphysema first appears at the root of the neck about the trachea and great vessels, reaching there along the bronchi, trachea, and vessels from the pleura. It also infiltrates the tissues about any wound in the parietal pleura.

After wounds of the lung there is often an infiltration of air about the external wound, and this is especially liable to occur if the wound is small or roughly sutured so that the air may, by the variations of intrathoracic pressure, be forced into the deeper tissues, but not through the skin.

Subcutaneous emphysema is rarely a matter of any moment. It is usually

slight in extent and quickly absorbed. It rarely ends in suppuration. But if the laceration in the lung acts in a valvular manner, pumping air into the lung with each inspiration and allowing none to escape with expiration, the emphysema may spread over all the thorax, even over the whole body, in which case the danger is from suffocation. The treatment is multiple incisions. At the same time the intrathoracic pressure must be relieved by paracentesis or drainage.

HERNIA OF THE LUNG.—Hernia of the lung (pneumocoele) occurs either through a wound in the thorax or in a yielding scar.

When it occurs in a wound, the laceration of the thorax is usually extensive and the lung unharmed. In the fluttering, irregular motions of the lung, its edge is protruded through the wound and then caught. Unless it slips back or is replaced it soon becomes cedematous and subsequently hardened, perhaps gangrenous.

The subcutaneous form of hernia is apparently always reducible.

TREATMENT.—When the hernia is through a wound its reduction must first be attempted. If this fail, or if the lung become gangrenous, it must be cut away with the thermocautery or allowed to slough away.

The other variety may be reduced and held in place by a pad or a broad belt.

IV. Foreign Bodies in the Chest.—Foreign bodies in the heart and pericardium have already received mention.

The foreign bodies in the chest produce no very characteristic symptoms. Their presence is usually suspected from the history, a history of inhaling some object (see TRACHEA, FOREIGN BODIES IN), ulceration from the oesophagus, or a wound of the chest. The last class

alone concerns us. These foreign bodies—bullets, fragments of bone, splinters of wood, shreds of clothing—are often either unsuspected or inaccessible. If they can be removed from the wound *without probing* they had best be extracted at once. If left *in situ*, whether in the chest-wall, the mediastinum, the lung, or the pleura, they may, if clean, become capsulated and never be heard from, though more frequently they become infected and set up suppurative or gangrenous inflammation, such as empyema or abscess, or gangrene of the lung. When such complications occur after a wound of the chest, the possibility that they are caused by a foreign body may often only be excluded by the use of the x-rays. The *treatment* is extraction of the object by thoracotomy or pneumotomy, and subsequent drainage.

V. Secondary Complications.

MURAL SUPPURATION.—The various forms of superficial thoracic suppuration are more distinctive in their nomenclature than in anything else. The “diffuse phlegmon of the thorax” is a low-grade infection occasionally seen in the cachectic or moribund. “Subpleural abscess” (peripleuritis) appears as a deep-seated abscess between or beneath the ribs. It simulates sacculated empyema. Its etiology is obscure. Subpectoral and axillary abscesses are common. They require prompt incision. The focus of suppuration may be deeply seated.

NECROSIS.—Necrosis of the ribs and sternum is rare, unless the fragment of bone is entirely separated from its periosteum and the rest of the bone. Extraction of dead bone is simple.

PLEURISY AND EMPYEMA.—Inflammation of the pleura is one of the commonest among the secondary effects of trauma to the thorax. Dry pleurisy or pleurisy with effusion follows nearly all

severe contusions. The effusion provoked by wounds or by hæmothorax is unimportant, and the ultimate adhesions have no peculiar significance.

Traumatic empyema usually follows hæmothorax (which see). Though the onset is acute, the febrile stage may pass over, though the pus remains in the chest, causing some dyspnœa and a chronic toxæmia.

In the *treatment* of traumatic empyema prophylaxis by the removal of hæmothorax as soon as the wound in the lung is healed is of prime importance. Beyond this the treatment is that of any other form of empyema (see EMPYEMA).

BRONCHITIS AND PNEUMONIA.—Bronchitis is almost as frequent a complication of injury to the lung as pleurisy. It appears early, and may run into broncho-pneumonia or œdema: two extremely grave complications. Lobar pneumonia following traumatism is a clinical curiosity (see BRONCHITIS and PNEUMONIA).

GANGRENE OF THE LUNG, ETC.—Gangrene of the lung may occur in a portion of the lung cut off from its blood-supply, but it is oftener an infective process about a foreign body (see PULMONARY GANGRENE). Abscess of the lung is also usually caused by a foreign body (see PULMONARY ABSCESS). Œdema of the lung and hypostatic congestion are terminal phases, related more directly to the weakness of the patient than to the injury.

PERICARDITIS, ENDOCARDITIS, AND MEDIASTINAL ABSCESS.—These subjects have been treated elsewhere.

VI. Operations upon the Thorax.

PARACENTESIS (THORACENTESIS; TAPPING, OR ASPIRATION OF, THE CHEST).—This operation consists in puncture of the pleura or a cavity in the lung and aspiration of its contents.

Paracentesis may be used as a diagnostic measure to determine the presence or quality of fluid in the pleura or lung, or as a therapeutic agent. The therapeutic indications are:—

1. Pleurisy with effusion, as soon as the fluid has reached the angle of the scapula.

2. Hæmothorax, as soon as the danger of secondary hæmorrhage has passed.

3. Empyema. Paracentesis confirms the diagnosis, but is rarely curative, even in children.

The Operation (see EMPYEMA, TREATMENT).

INCISION AND DRAINAGE (THORACOTOMY).—This is a more formidable operation than paracentesis, and requires the preparations and asepsis usual in a major operation. The operation is indicated for pleurisy with effusion when repeated tapplings have failed to cure, and in empyema almost always.

The following rules may be borne in mind:—

1. Local is safer than general anæsthesia.

2. In selecting the site of incision little stress need be laid on “dependent” points which do not remain dependent in a patient tossing about in bed.

3. Resection of a rib is good routine practice, though children usually do as well without it.

4. Any sudden cyanosis or attack of dyspnœa occurring *before* the pleura has been incised is an indication for immediate incision to relieve tension. If this fails, or the attack occurs *after* the pleura has been incised, roll the patient over, bringing his normal lung uppermost.

[I once nearly lost a case who (having been given ether) was placed in bed after operation lying on his sound side. Respiration grew rapidly feebler; but when apparently at his last gasp he was turned

over and immediately rallied. EDWARD L. KEYES, JR.]

5. Never irrigate the pleural cavity at the time of operation except in putrid or gangrenous cases, nor after operation unless the patient is losing ground.

Thoracoplasty.—See EMPYEMA.

POSTERIOR THORACOTOMY.—The purpose of this operation is the removal of tumors from the posterior mediastinum, or the extraction of foreign bodies lodged in the bronchi or the œsophagus above the ninth rib. The operation has been performed only a few times, usually for obstruction of the right bronchus (opposite the angle of the fifth rib), on a level with the tip of the spine of the fourth dorsal vertebra). A musculocutaneous flap covering three ribs is turned back toward the spine. A segment of the central rib is resected with a chain-saw, great care being taken not to injure the pleura. The two adjacent arteries are then tied, and the upper and lower ribs resected and turned back with the soft parts. The pleura, thus exposed, is pulled away. The œsophagus is then recognized by a bougie inserted into it, the bronchus by its incomplete rings of cartilage. An electric headlight enables the operator to see the bottom of the deep hole. The foreign body or tumor is seized and removed, drainage is inserted, and the wound dressed aseptically.

The operation is rarely indicated and still more rarely successful.

Pneumotomy.—Paracentesis of the lung for the purpose of aspirating pus or of injecting antiseptics is to be condemned. Paracentesis for diagnosis, but incision always for treatment.

For hydatid cysts and localized gangrene or abscess, especially if caused by foreign bodies, the operation is clearly indicated as the only probable means of

relief from a condition always serious and usually fatal. The operation has also been performed for the drainage of tubercular and bronchiectatic cavities. In the latter class it has been fairly successful when the single suppurating cavity constituted practically the whole disease; but in tuberculosis the wide distribution of the lesions, as well as the unfavorable reaction of the disease to stimulation, forbid any operative interference.

THE OPERATION.—The seat of disease having been determined by the physical signs and aspiration, the superficial tissues are divided and one or more ribs resected, great care being taken to avoid injuring the pleura until it has been exposed. If adhesions are present the knife is discarded and the pleura and lung incised with the actual cautery heated to a dull-red glow. The seat of disease is thus freely laid open and the patient rolled over to encourage outflow of its contents. Drainage by gauze and tubes is established and hæmorrhage checked by pressure.

In case the pleural adhesions are absent the operation is much more difficult and the prospect poor. Not only may the sudden influx of air carry off the patient in shock, but incision and drainage of the fluttering lung is extremely difficult. Suturing the lung to the chest-wall as a preliminary to incision of the pleura is no simple matter, and does not prevent partial pneumothorax.

Irrigation of a cavity in the lung is liable to drown the patient.

Pneumectomy.—Rabbits have survived complete extirpation of a lung. Man has not. The excision of tumors and tubercular foci has been practiced along the same lines as pneumectomy. But, to dismiss the subject briefly, tumors are either benign or malignant.

If benign they require no interference; if malignant they cannot be entirely removed. As for tuberculosis, Koenig says: "To perform such an operation the surgeon must ignore absolutely all his knowledge of pathology" (Peyrot).

Inflation of the Pleura.—Inflation of the pleura with nitrogen-gas to "splint" the tuberculous lung has been recommended as a cure by Dr. Murphy, of Chicago. The technique is that of paracentesis, *mutatis mutandis*. Nitrogen-gas is used, since it remains in the chest unabsorbed for weeks, while other gases are absorbed in a few days.

[I learn from Dr. J. Edward Stubbart that he has been very successful in checking severe hæmoptysis by inflation of the pleura. EDWARD L. KEYES, JR.]

Paracentesis Pericardii.—Puncture of the pericardium is usually performed in the fifth left intercostal space two inches from the border of the sternum, in order to avoid the internal mammary artery. The preparations are the same as for thoracentesis; but the needle is only plunged into the muscle, and then introduced slowly until the pericardium is reached. While the fluid flows away a finger is kept on the pulse, and the tapping interrupted or stopped if the heart's action becomes weak or irregular. Aspiration should not be employed.

INDICATIONS.—Interference with the heart's action by serous pericarditis calls for paracentesis. Hæmopericardium and pyopericardium demand pericardotomy (see PERICARDIUM).

Pericardotomy.—The incision is made in the fifth left space, and part of the rib resected. The internal mammary artery must be respected. Irrigation should never be used.

Puncture of the Heart (PARACENTESIS AURICULI).—This operation has been performed for the relief of congestion

of the right heart. It does not commend itself.

Puncture and injection of stimulants into the wall of the left ventricle is reputed to have revived the heart after it had apparently ceased beating in alcoholics. In such a case there is little to be said against it.

Suture of the Heart.—The prime requisites for success in this operation are speed and boldness. As soon as it is determined that without operation the patient will die, no further time should be wasted, even over asepsis. Operate at once or not at all.

As the right ventricle passes under the sternum at each systole, the best incision is Rydygier's or some modification of it—across the sternum and an inch beyond, just above the third rib. From the (left) end of this incision an oblique cut crosses the third, fourth, fifth, and sixth ribs downward and outward. Sternum and ribs are divided, the flap turned back, the internal mammary arteries secured, and the pericardium laid open from top to bottom and held open with clamps. The wound in the heart is sutured with a small needle and fine silk. The sutures are passed and tied during systole and must not pierce the endocardium. If the heart falter or stop, let the operator speed the more. Finally the pericardium is delicately emptied of clots, sutured roughly, and the flap replaced. In the meanwhile stimulation and infusion are plied.

LEWIS A. STIMSON,
EDWARD L. KEYES, JR.,
New York.

WOUNDS AND STINGS, VENOMOUS.

Insect-bites and stings.

These may be divided into three general classes. In the first may be included the minute bites and stings of the smaller

insects,—the flea, the mosquito, the bed-bug, etc.,—in which the lesions are purely local and of slight importance; in the second may be placed the stings of bees, hornets, wasps, etc., in which there is considerable local pain and sometimes constitutional manifestations; while in the third may be included the stings or bites of scorpions, centipedes, venomous spiders (the tarantula, for instance), etc., in which severe local and general disturbances may ensue. The more important of these are separately considered below.

Treatment of Bites and Stings in General.—While special measures are indicated in some instances, a general foundation for the remedies to be used lies in the fact that the poison introduced into a wound by any insect is strongly acid in nature, and that the local effect is primarily one tending to producing coagulation and agglutination of the corpuscular elements of the blood. Hence the well-known value of ammonia in such cases whether applied in weak solution over the skin, or in strong solution or pure into a wound. Permanganate of potassium in 1- to 5-per-cent. solution is also effective for the same reason. The properties of common salt in saturated solution are well known to every housewife. Common clay or clean mud applied over a wound are favorites among wayfarers.

According to Ottinger (Sem. Méd., p. 250, '96), the best treatment for the bites of venomous insects, of whatever family, consists in covering the part pricked with a thick coating of a mixture of equal parts of ichthyol and lanolin, or, even better, pure ichthyol. In case the insect-bite has already determined the tumefaction of the member, the latter is painted over its entire length with pure ichthyol and covered with a sheet of gutta-percha, on which ice is then applied.

For travelers, soldiers, etc., carbolic

acid is an excellent preventive agent, not only against the mosquito, but also one tending to keep off the numerous other pests—ticks, fleas, lice, horse-flies, etc.—with which practically all countries are infested. The use of a strong carbolic-acid soap for washing purposes suffices when insects are not numerous; in malarial regions, however, especially when mosquitoes are numerous, the protection must be increased in proportion. This can be easily done by dipping the hands, after the ablutions are over, into a bucketful of water containing an ounce of carbolic acid, and passing them, while wet, over the face, neck, and ears,—any portion of the body that may be exposed. If the parts thus moistened are not wiped the water will evaporate, leaving a thin film of carbolic acid over the skin, which thoroughly protects it until completely washed off by the perspiration. If resorted to before retiring, the protection usually lasts during the sleeping-hours. When carbolic acid is not available an emulsion of common kerosene or petroleum is an excellent substitute.

A handful of laurel-leaves boiled in a pint of lard makes an ointment which, applied over the hands and face in insect-infected districts, affords efficient protection.

Mosquito.—The blood-sucking mosquito (*Culex anxifer*) is to be found almost everywhere, but exhibits the extremes of virulence on the shores of the Arctic Ocean and in the tropics. The female is the offender, and, after sucking a portion of her victim's blood, replaces it with the poison that leads to the familiar itching, swelling, and, sometimes, to more violent inflammation.

Besides the power of transferring the germ thought to be capable of giving rise to the *Plasmodium malariae*, the mosquito is also a medium for transference

to human beings of the *Filaria sanguinis*. Yellow fever has also been included by some observers in the list of affections which the mosquito may convey by its bite.

TREATMENT.— Besides the measures indicated above, aqua ammoniæ, which reduces the suffering if applied with a little rag and left *in situ* a few moments, often proves useful. Menthol sometimes affords considerable relief, the crystalline solid or camphoraceous substance being rubbed over the surface.

To prevent the development of mosquitoes in pools, permanganate of potassium has been recommended. Two and one-half hours are required for a mosquito to develop from its first stage to its active and venomous maturity. The insect in all its phases may be instantly killed by contact with minute quantities of permanganate of potassium. One part of this substance in fifteen hundred of solution distributed in mosquito marshes will render the development of larvæ impossible; a handful of permanganate will oxidize a ten-acre swamp, kill its embryo insects, and keep it free from organic matter for thirty days. An efficacious method is to scatter a few crystals widely apart. A single pinch of potassium permanganate has killed all the germs in a thousand-gallon tank.

In foul, mosquito-breeding pools, the water of which cannot be used, the mosquitoes infesting it, their larvæ, and nymphæ can be easily overcome by pouring into each sheet of water a quantity ranging from a few ounces to a pint of petroleum.

Bee-, Wasp-, and Hornet- Stings.—The sting of a bee is barbed at the end, and is, consequently, always left in the wound; that of a wasp is pointed only, so that they can sting more than once. Swelling comes on very rapidly and

spreads very quickly. The hornet's sting is the most severe, and the bee's the least. The wasp, an insect allied to the hornet, is capable of stinging severely also.

The pain of the stings of venomous insects like the bee depends less upon the introduction of the sting into the part than upon that of the venomous fluid. Experiments tend to prove that when the little poison-bag, situated at the base of the sting, has been cut off, a wound with the sting produces no pain. The poison flows from the vesicle through the sting at the instant when this passes into the flesh.

Several stings may cause serious constitutional disturbance. Under such circumstances a stimulant will be first required, after which the sting or stings should be removed with a fine-pointed forceps, or, if they are too deep to be laid hold of, the hollow tube of a small key may be placed over the injured part, so that the puncture shall be in the middle, and by pressing it firmly down the skin be caused to rise in the hollow, when the sting will probably start out, or a watery fluid will escape, carrying with it some of the venom. If a lens is at hand, it will be well to examine each wound, when perhaps the sting may be seen, and it may be extracted with the forceps.

In the treatment of bee-sting ipecacuanha powder made into a paste and smeared over the parts affected prevents, to a large extent, the swelling and pain. George King (Indian Med. Gaz.; Pract., July, '96).

Literature of '97-'98-'99.

Ammonia-water applied to the injured part will produce immediate relief. Sodium bicarbonate dissolved and the application of sweet oil or glycerin are useful. R. E. Wrafter (Indian Lancet, June 1, '97).

The immunity of bee-keepers from the effects of bee-poison studied. One hundred and twenty-four bee-keepers were immune, 9 of them being naturally so to the sting of bees; 26 could not ac-

quire immunity. The number of bee-stings to produce immunity varied considerably, sometimes 30 being sufficient, but in many cases as many as 100 were necessary. The most favorite means of dealing with bee-stings is spirit of ammonia. A 5-per-cent. solution of permanganate of potash will counteract the poison, and an injection of a 2- to 5-per-cent. solution is recommended. Langer (Scalpel, May, '98).

Wood-tick (Ixodes).—Blood-sucking ticks of various kinds are common in most countries. In the tropics the so-called *Carapata* is that most frequently met with. They bury the whole head in the flesh, and distend their bodies with blood ere they are discovered, and any ordinary attempt at removal only detaches the latter, leaving the head behind to create trouble.

The head should be removed with needle or knife, and the wound subsequently dressed antiseptically. Turpentine applied to the rear end of the insect sometimes causes it to loosen its hold. Any essential oil, or a drop of chloroform injected with an hypodermic syringe, frequently brings about the same result.

Jigger.—An insect that closely resembles the common flea, and that in Cuba and Porto Rico demands to be specially guarded against, is the nigua, chigo, or jigger (*Pulex penetrans*). It is the female only that is annoying, and she is especially apt to work her way beneath the skin at the ankles, or preferably at some part of the foot, most often between the toe-nail and the flesh, but sometimes between the toes. Having buried herself, an intolerable itching results, which, at first is rather agreeable than otherwise, but after a few hours merges into most violent pain. At the same time a small, white, bladder-like tumor about the size of a pea, with a dark spot in the centre, develops under the skin.

The tumor is the rapidly-growing nest, developed from the posterior portion of the body of the chigo, and the black spot is the anterior portion of the little pest.

TREATMENT.—To rid the part of the incumbrance, Mexican guides apply a lighted cigarette to the spot, the heat of which penetrates sufficiently to destroy the insect. But a somewhat more delicate operation is performed by negro women; with a fine needle they remove the skin from the little ball or nest precisely as one would peel an orange, and then making pressure with the thumbs, succeed in squeezing out the sac of eggs; the cavity is then filled with snuff or tobacco to guard against the possibility of development of any eggs that may accidentally have escaped from the sac and have been left behind. The unacclimated persons and all newcomers are especially subject to the attacks of the chigo. Excruciating, violent inflammation and even gangrene have resulted from neglected chigo-sores.

Sand-fly.—The minute sand-fly is more venomous than either the gnat or mosquito. It is most abundant near the water, but, unlike the latter, it does not haunt marshy districts and damp herbage, but rather sandy and ridgy ground. The remedial and preventive measures recommended in the case of mosquitoes are also useful here.

Vivigagua.—This is a species of ant that lives in considerable colonies in the West Indies, chiefly in and about the sugar-cane fields. It bites with exceeding fierceness, producing the impression that one has been pierced by a red-hot needle. Unfortunately there is no protection to be had from its onslaughts except carefully burning over the ground before camping or using a liberal sprinkling of insect-powder, or of poke-root and borax mixed.

Diablito Colorado.—This is an exceedingly-minute insect which lives in the grass and on shrubs in tropical regions. It is so minute that its presence can hardly be detected with the naked eye. It has several names according to locality, though *diablito colorado* (little red devil) is the prevailing one. Because of its bright-scarlet hue, the French colonists term it *bête rouge*. It abounds during the rainy season, and its bite causes intolerable itching, which, as Schomburg expressed it, “by day drives the perspiration from every pore, and at night makes one’s hammock resemble the gridiron on which St. Lawrence was roasted.” Nevertheless the bites must not on any account be scratched, since if the skin is once broken or abraded a most ugly sore is apt to result that will be very difficult to heal.

Scorpion.—Scorpions are peculiar to the tropics and subtropics. They for the most part hide under stones, fallen tree-trunks, in the roof, thatch, and dark corners of deserted huts, and obscure parts of inhabited dwellings; they often take possession, over night, of one’s boots, stockings, or trousers. Their weapon is in the tail, and it is used by bringing the latter forward over the back and head; but the creature first endeavors to lay hold of the object it desires to sting with its claws, or lobster-like pincers. The stings of scorpions very rarely prove fatal except in young children. They are not dangerous to persons in good health, though considerable inflammation and swelling may be produced, and even persist for a couple of days, along with slight fever; it is only in rare instances these symptoms present any marked degree of severity. The American varieties of scorpion are much less virulent than their European, African, and Asiatic brethren.

TREATMENT.—Scorpion-stings are easily relieved by camphor, rum, lemon-juice, or solution of carbolic acid.

Centipede.—A centipede’s bite is about as venomous as the sting of the scorpion, and may prove serious in children and persons weakened by excessive fatigue, disease, and the inordinate use of alcohol. Like the scorpion, it is apt to penetrate into crevices and other dark places, and it occasionally ensconces itself into the depths of a boot or shoe. Hence the advisability of always shaking out footwear before putting it on in tropical countries. The venomous species may be recognized by the fact that its legs are quite short, and that each segment of the body bears a single pair of legs. The body is usually flattened and brownish yellow, and the antennæ are long and many-jointed. The so-called “centipede” with long legs met with in Northern climates is not the true centipede.

TREATMENT.—The treatment of centipede-bites is the same as that of the sting of the scorpion.

Spiders.—In the North spiders have a worse reputation than they merit, the bites ascribed to them being inflicted by other insects. In Southern California, which is a semitropical region, so-called spider-bites are ascribable to the pirate-bug (*Rhasahus biguttatus*), according to A. Davidson (Ther. Gaz., Feb., '97).

In the tropics the majority of spiders are not to be classed as poisonous, but their bites seem especially prone to provoke ulcerations that are healed only with the greatest difficulty. The ground and trap-door spiders grow to great size—often the body alone is 2 or 2 1/2 inches in length. They are hairy, most repulsive creatures, living in wells or tubes excavated in the soil, with a trap-door stop which is closed when the tenant is at home. The common trap-door spider

is generally known as "tarantula" in Jamaica and Cuba, because of its close resemblance (but generally is of smaller size) to the true tarantula, which is also found, but more sparingly. Both inflict wounds, when opportunity offers, but these wounds are not of the highly poisonous and dangerous nature generally imagined.

TREATMENT.—Any of the preparations recommended for mosquito-bites are also useful in spider-bites. In severe cases the local injection of a 5-per-cent. solution of permanganate of potassium may prove advantageous, the patient's strength being simultaneously sustained by means of strychnine and, if need be, stimulants. Strong coffee enjoys great confidence in this particular.

Horse-fly.—The so-called "horse-flies," or deer-flies, occasionally attack man, and torture all four-footed creatures in the tropics. All are blood-suckers, and often deposit their larvæ along the spine, where the skin is thinnest, of horses, mules, etc.; one species deposits its eggs in the nose of these creatures. The bites are painful and persistent. Acute inflammation followed by general toxæmia has been observed after these bites in individuals previously weakened by disease or such excessive fatigue as soldiers are exposed to during campaigns. It usually attacks the back of the neck.

The laurel-leaf ointment and the carbolic-acid solution referred to under **TREATMENT OF BITES AND STINGS IN GENERAL** are excellent preventives for man and beast, while the general measures given are also applicable for the treatment of bites.

Land-leech.—The Philippine Islands are infested with a blood-thirsty land-leech, most tormenting, but not dangerous, whose attacks in certain districts are not to be avoided except by the use

of stout, tight-fitting, canvas leggings. In those of robust health leech-bites amount to little beyond mere annoyance, the difficulty sometimes encountered in stopping the bleeding, slight inflammation, and itching. But in those of degraded habits or in poor health, the punctures, if rubbed or scratched, are liable to degenerate into ulcers that may lead to loss of limb or life.

Snake-bites.—There are over twenty-five species of poisonous snakes in the United States, the most common of which are the rattlesnake, the common viper, the copperhead, and the moccasin. In Northern climates, however, their activity is less marked than in tropical regions, and the bites are comparatively few. Cuba, Porto Rico, and the Philippines also possess a number of varieties, the most virulent, according to Stockwell, being the boaquira, or juba, in Cuba and Porto Rico, and two venomous boas and a variety of viper in the Philippines. The former is described by this author as not more than four or five feet long, and practically, if not specifically, identical with the rattlesnake of Florida. It can generally be recognized by its mode of coiling when about to assume the offensive, and the warning it always gives before striking.

Howard A. Kelly (Johns Hopkins Hospital Bulletin, Dec., '99) recently lectured upon these reptiles and gave the following general distinguishing features:—

The *poisonous snakes* of this country belong (excepting the little harlequin snake) to the group of pit-vipers. The "pit" found in all consists of a depression over the lip between the eye and the nostril. The head of pit-vipers is triangular, with massive muscular development of the jaw. Venomous snakes are thicker in proportion to their length,

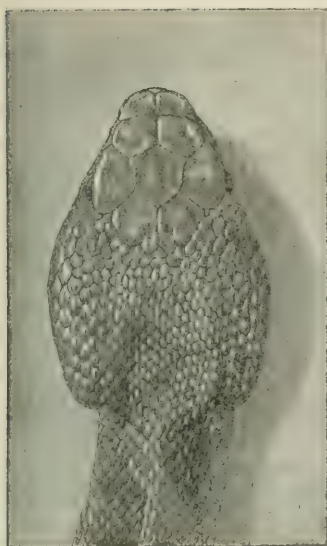


Fig. 1.



Fig. 2.

Figs. 1 and 2.—*Copperhead*: common pit-viper. See pit just behind nostril; oval pupil. Color: light chocolate or lustrous copper, with dark, alternating patches; belly yellowish. Rarely longer than three feet. Vicious, but quantity of venom available less than that of rattlesnake. (Howard A. Kelly, Johns Hopkins Hospital Bulletin.)

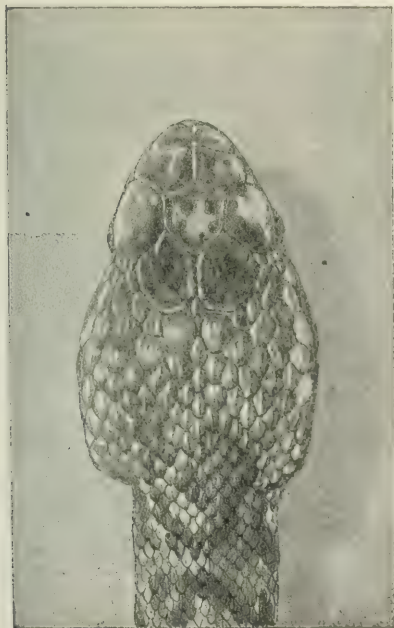


Fig. 3.



Fig. 4.

Figs. 3 and 4.—*True moccasin*. See pit in front of the eye in Fig. 4 and oval pupil. Dark-greenish brown, sometimes almost black, with slightly darker bars. Broad in proportion to length; triangular head; thick jaw. But one recorded fatality. (Howard A. Kelly, Johns Hopkins Hospital Bulletin.)

and their surface appears rough. The pupil is elliptical instead of round.

The *harmless snakes*, on the contrary, are usually slender and smooth. The head is elongated and oval or round. The pupil is round. Among these are many kinds thought venomous, the "orange-bellied moccasin," for instance, which is confused with the true moccasin and needlessly killed. Many of the harmless are useful through the fact that they destroy field-vermin, while others, such as the black-snake, destroy venomous reptiles. (Howard A. Kelly, Johns Hopkins Hospital Bulletin.)

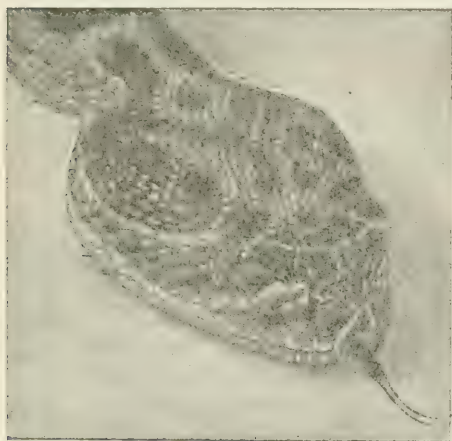


Fig. 5.—*Rattlesnake*, distinguished by caudal "rattle." Note pit below and behind nostril and oval pupil. Diamond-shape or banded markings, which are sometimes obscured by general dark color. Background mottled buff or greenish yellow. Head massive and triangular. (Howard A. Kelly, Johns Hopkins Hospital Bulletin.)

The claim that venomous serpents can always be detected by their broad, flat, lanceolate heads is not to be depended upon, according to Stockwell; but this author also lays stress upon the pit behind the nostrils and the elongated vertical pupil observed in other nocturnal creatures. He states that no venomous serpent will ever be found in or on a

tree; while most have clubbed, instead of slender, tails. Rattlesnakes prefer, as a rule, the more elevated and stony districts. When other evidence is lacking as to the character of the reptile, it may be pinned to the ground by means of a short-forked stick pressed upon the neck immediately behind the head, when the mouth can be pried open and examined for poison-fangs; commonly, under such circumstances, the fangs will be seen hanging perpendicularly from either side of the forepart of the upper jaw, or they may be directed forward in a horizontal plane, just projecting beneath the upper lip—the position for wounding or striking; besides, if the creature is enraged, minute drops mixed of venom and saliva will be seen exuding and dripping from the fangs. If the serpent is quiescent, these fangs are retracted until they lie horizontally along the upper jaw with their points looking backward.

Though rattlesnakes are dangerous, more so in warm than in more temperate regions, the wounds they inflict are not so universally fatal as popular prejudice would lead people to believe. This is dependent on two causes, viz.: season and habits of life. Their maximum virulence is developed during the hot season, or the period of reproduction. But venomous snakes, with few exceptions, are sluggish, and the poison they possess is given them as a means of securing prey; this poison, consequently, is a powerful paralyzant, and the creature bitten cannot get far away from his would-be devourer. Once a creature is bitten, the major portion of the poison contained in the sacs at the base of the fangs is used up, and it requires hours to reproduce it in any quantity. The second use of the fangs, consequently, does not develop the virulence that obtains to the first; and the third is still less venomous and per-

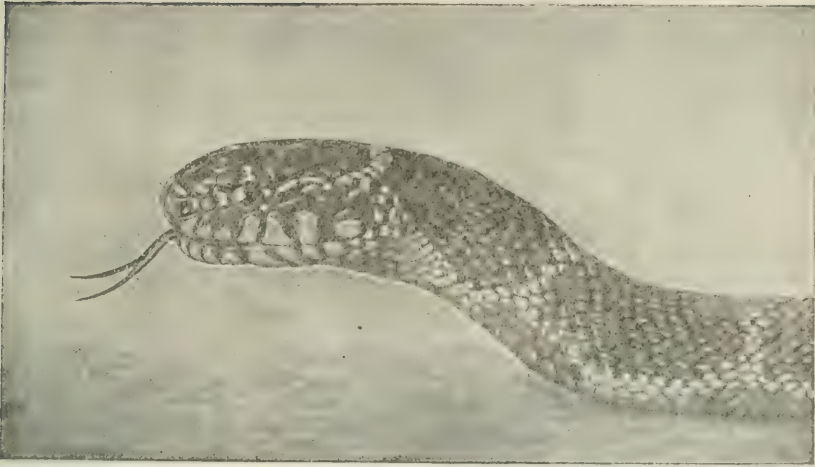


Fig. 6.

Fig. 6.—*Harmless black-snake, or chain-snake*: an enemy of venomous snakes and vermin. Note round pupil, absence of pit, and rounded head. (Howard A. Kelly, Johns Hopkins Hospital Bulletin.)



Fig. 7.



Fig. 8.

Figs. 7 and 8.—*Common water-snake*, erroneously termed "water-moccasin." Note round pupil, absence of pit, and narrow head. Perfectly harmless. (Howard A. Kelly, Johns Hopkins Hospital Bulletin.)

haps not at all so, the fluid exuded by the fangs being merely a secretion analogous to that developed in the salivary glands of man. Even after the fangs are removed the creature sometimes develops a new pair with surprising rapidity, the only safeguard being to destroy the bulb at the root of each of these tiny weapons. The vipers of the far East are more abundantly supplied with venom than the rattlesnakes, and it is more virulent and more quickly renewed.

the neck. The other venomous reptile is a small viper, allied to the *Tic palunga* (or Russels viper) of India, Ceylon, Sumatra, Java, the Malay Peninsula, etc. It is, for the most part, nocturnal in habit, and during the day lies coiled up in some nook beneath thick herbage. It is well to examine boots and clothing for its presence, before donning the same in the morning. This viper may be recognized by its club-shaped, or obtusely-pointed, tail.

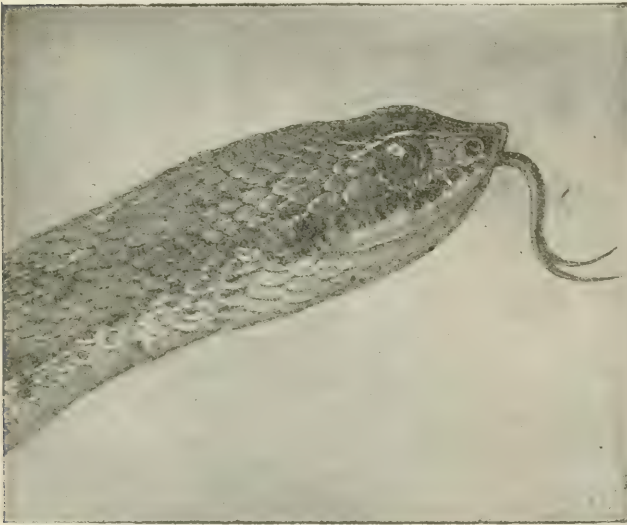


Fig. 9.



Fig. 10.

Figs. 9 and 10.—*Puffing adder*. Harmless; destroys field-vermin. Gentle and easily tamed. When frightened, it swells its head and hisses loudly. Note round pupil and absence of pit. (Howard A. Kelly, Johns Hopkins Hospital Bulletin.)

Two venomous reptiles, beside a form of boa, inhabit the Philippines—one of the former, fortunately, somewhat rare. This latter frequently attains a length of nine or ten feet, and, unlike poisonous reptiles as a class,—there are but three or four exceptions,—is apt to take the offensive and attack man. One should never flee from it, since then his fate is sealed, but, facing the reptile, attack it with a stick or club, and, fortunately, it is easily dispatched by a slight blow on

SYMPTOMS.—The symptoms following snake-bite are similar, whatever be the kind of offending reptile, but they vary in intensity according to the quantity of venom injected and the kind of serpent. But slight pain is at first experienced; this gradually increases, however, until it becomes severe. The tissues surrounding the wound become infiltrated, swelled, and ecchymotic, and in some cases gangrene follows. The influence of the poison on the centres now appears,

the respiration becoming labored, and cardiac action abnormal: *i.e.*, weak and irregular. Cold sweats, faintness, nausea, and vomiting simultaneously appear, and the patient may sink in a few hours from cardiac paralysis. When the case passes safely through the first thirty-six or forty-eight hours, the destructive influence of the venom upon the protoplasm of the blood-corpuscles and tissues manifests itself by more or less violent mental symptoms or exhaustion and coma. In many cases, however, when the patient is otherwise strong, he slowly recovers. Individuals weakened by disease, overwork, or insufficient food; children, and weak women are those in which the prognosis is unfavorable.

TREATMENT.—The first step in the treatment of serpent-bites is to apply a ligature—a tightly-tied and twisted cord or handkerchief—about the bitten limb and above the wound. As the poison exerts its chief effect upon the brain and nervous centres, as evidenced by drowsiness, stupor, and failure of heart and respiration, every effort should be made to combat the two former and sustain the two latter, which is best done by violent exercise, physically enforced if necessary. Suction has often been resorted to; it affords no danger to the person practicing, unless the lips be cracked or the mucous membrane of the mouth be abraded in some way. This being done, the part bitten should be excised, using a penknife if nothing else be at hand; two crescentic incisions meeting at the ends and bottom should be made, and the part allowed to bleed freely. When the skin of the bitten part can be raised between the fingers, it may be pinched up and cut out with scissors. If the bite is found to be deeper than the skin, a small piece of the deeper tissues may also be removed. Cauterization with a hot iron

is also advised, but it is quite as painful and less reliable a means. It may be useful, however, if excising instruments, a scalpel or knife, are not at hand and after suction. A piece of thick wire, a darning needle, etc., may be heated red-hot in the flame of a lamp, candle, or of a bundle of matches constantly fed by new ones and its tip is quickly inserted into the wound until every part of it is well burned. This should only be considered as a temporary means, however, and the part should be excised as soon as at all possible, since absorption is exceedingly rapid.

Chemical destruction of the poison is a possibility, but it is seldom that the required agent is at hand. The best of these are a 5-per-cent. solution of permanganate of potassium and strong ammonia. Either of these may be injected into the wound with an hypodermic syringe.

Literature of '97-'98-'99.

Subcutaneous injection of a solution of permanganate of potassium both around and into the bite recommended in the treatment of snake-bites. In very poisonous varieties a 5-per-cent. solution may be necessary. In adder-bites Dr. Sallden, a Swedish physician, has found a 1-per-cent. solution sufficient. The injection must be given as soon as possible. Ligation of the bitten limb will retard the absorption of the virus, but not over twenty-five minutes. Lacerda (Indian Lancet, July 1, '97).

Cardiac stimulants, digitalis and alcohol, by the mouth are important adjuvants, but their stimulating effects are not obtained with large doses, as is well known. A tablespoonful of whisky or brandy and 10 drops of tincture of digitalis in a half-glassful of hot water is an excellent means to sustain the heart's action, the pulse being the guide.

It has long been known that the bile

of venomous serpents was a powerful antidote to the venom. It is now, however, the rule, according to Fraser, that the bile of any particular species is most efficient against its own venom; thus, the bile of the crotalus and several other species is more efficient against cobra-venom than that of the cobra itself. If, instead of venom, the toxins of infectious disease be employed, it is found that the bile is a more or less efficient antitoxin. This quality is shared, however, by the bile of rabbits, and to a less degree by that of many other animals. As toxins and venom are excreted by the intestinal tract, the bile is most favorably situated for acting upon them, and remedies, therefore, stimulating hepatic secretion should increase the resistance of the animal. Moreover, toxins introduced into or generated in the intestinal tract are those neutralized. It is probable that the particular constituent is, in part, antitoxin or antivenom that has been eliminated from the blood into the bile. Calmette, on the other hand, considers that the active principle in the venom of all snakes and other poisonous reptiles, lizards, scorpions, etc., is a serum common to all, which would immunize, therefore, against all these alike.

Literature of '97-'98-'99.

The antivenomous serum personally discovered and prepared. It antagonizes the action of all venomous poisons, and the reason certain others have not secured results equally as good is that they have not taken into full account the difference in weight between the animals experimented upon, and have therefore not used the serum in doses proportionate to the weights and resisting power of the animals employed. In spite of adverse criticism it is maintained that the serum of an animal hypervaccinated against a very active venom can, when injected in a sufficient quantity, prevent the death of an animal

inoculated with fatal doses of venom of other serpents. Calmette (Brit. Med. Jour., May 14, '98).

Calmette's antivenomous serum in the treatment of inoculations with the poisons of Australian snakes has a slight, but distinct, protective effect against one of the constituents of these venoms, but, on account of its present slight antitoxic strength, it is practically valueless as a remedial agent in Australia. C. J. Martin (Brit. Med. Jour., Dec. 17, '98).

WOUNDS (SEPTIC) AND GANGRENE.

Septicæmia.

Definition.—Septicæmia is an acute febrile affection characterized by marked nervous, cutaneous, and visceral manifestations, and due to the introduction into the system of bacteria or their toxins, or both, derived from an infected wound.

Varieties.—There are two varieties of septicæmia: *true septicæmia*, in which micro-organisms, especially bacilli and micrococci, penetrate into the blood and there multiply; and *sapræmia* in which the toxins or ptomaines alone of the pathogenic organisms enter the system and cause chemical poisoning. Both varieties often exist simultaneously.

Sapræmia.—The symptoms of *sapræmia* are those of poisoning by a chemical agent. The disease sometimes begins with a chill, soon followed by a marked rise in the temperature; but in most cases the latter is the first evidence of the disease. The skin becomes cold and clammy; there is marked prostration and sometimes diarrhœa. When these manifestations occur while a wound is present, they are ominous, and the dangerous complication can often be avoided if the dressing of the wound is renewed and perfect antiseptic precautions are taken to thoroughly remove all septic matter from its surface. The constitutional

symptoms often disappear of their own accord, when this is done, if the systemic infection is not already sufficiently advanced to thwart all endeavors.

Wounds that are undergoing putrefactive changes and free from healthy granulations usually represent the foci of infection under such circumstances. The disease is also caused when an exposed surface such as that of the uterine cavity is exposed to the effects of a putrefying placenta or clots. (See ECLAMPSIA.) Psoas abscesses or gangrenous wounds, peritoneal injuries, accumulations in the peritoneal cavity of blood-clots, and insufficiently-drained wounds represent the conditions which may give rise to *sapremia*.

The general poisoning induced as a result of the absorption of toxins in such acute infectious diseases as diphtheria, typhoid fever, etc., in which foci of infection occur, owes its origin to the latter also, through the absorption of toxins. The ingestion of poisonous foods, putrid meat, or other organic matter is also productive of a form of *sapremia*.

True Septicæmia.—In this condition, as stated, the septic infection is due to the presence of bacilli or micrococci in the blood. The invasion is more gradual and the symptoms develop less rapidly. Fever, headache, vomiting, diarrhœa, anorexia, great prostration, and mental torpidity—in a word, a general typhoid condition—constitute the array of symptoms witnessed when septicæmia is developing after an injury or surgical operation.

The fever is of the continued type and gradually increases, the temperature becoming suddenly raised when a period of danger is reached. In rare cases, however, fever is absent, and, when the abdomen is the seat of the injury (gunshot wounds, hernia, etc.), the temperature

may even be subnormal. The pulse may be strong and rapid at first, but it gradually fails in power until it becomes easily compressible and weak, though very rapid. After abdominal lesions the pulse may remain extremely rapid, while the temperature is subnormal.

In a certain number of abdominal operations patients die of acute peritoneal septicæmia. The serious symptoms develop within twelve hours after operation, and death occurs within thirty-six hours. Lesions found after death are dilatation of coil of intestines and fine arborescent vascularity of the peritoneal coat. The peritoneum may be dull, and a little sero-sanguinolent fluid is found in Douglas's pouch. Fatty degeneration of the liver-cells is found, commencing around each portal canal, and later spreads toward the centre of the lobule. Clinically these hepatic lesions are usually manifested by an icteric tinge of the skin (Jayle). One of the most striking symptoms is rapidity of the pulse, often without a corresponding rise of temperature. Hartmann (*Annals de Gynéc.*, Feb., '96).

Diarrhœa is frequently observed, but it is seldom as violent as in cases in which the general toxæmia is due to the ingestion of toxic foods. It is but a manifestation of the gastro-enteritis which attends the majority of cases. Vomiting also occurs, but is rarely severe. The spleen is enlarged in most cases; indeed, all the lymphatic glands show a marked tendency to become infiltrated and enlarged. The urine usually shows considerable albumin and casts.

The blood undergoes rapid deterioration, owing to the presence in the blood of micrococci. As a result, the skin becomes pale and yellowish, and shows a punctate eruption—minute areas of cutaneous hæmorrhages—sufficiently like that of scarlatina as to suggest the presence of the latter disease. Other cutanc-

ous manifestations may also be witnessed and present analogies to those occurring in connection with other diseases, roseola, herpes, superficial œdema, etc. At first the skin is hot, dry, and rough; gradually it becomes doughy, bathed in perspiration, and often cold and clammy. Often a yellowish tinge suggests icterus; this is less marked, however, than in pyæmia.

Toward the later stages, complications may develop. Endocarditis may occur, and, its appearance being very insidious, is sometimes far advanced when discovered, the physical signs being less marked than is usually the case in this disease. Gradually the sallow hue of the skin deepens, the mental torpor lapses into stupor, and dulling of the senses becomes perceptible in every way. The tongue becomes dry and thickly furred; the urine, at first scanty, becomes concentrated and sometimes has to be drawn with the catheter. Delirium is replaced by coma, soon followed by death.

The local manifestations vary; indeed, none may appear. This is especially the case when the disease runs a very acute course. On the other hand, a severe local inflammatory process may develop, accompanied by sloughing and rapidly spreading gangrene. This is frequently observed in connection with slight injuries, such as those to which surgeons are exposed. In such cases the wounded finger becomes inflamed and painful, red streaks appear on the arm, and the lymphatic glands of the member swell. Prompt measures may even here arrest the process or general toxæmia follows.

In accidents involving crushing the general septicæmia may follow contamination from the dead tissues, traumatic gangrene with putrefactive inflammation of the neighboring uninjured tissues ensuing. Moist gangrene, the rapidly-

spreading gangrene (*gangrène foudroyante*, with evolution of gas), may thus act as foci which rapidly bring on death. There is great swelling, with local emphysema with crackling sounds, the mass giving off a very foul odor. The mass of tissue becomes totally decomposed if the patient lives long enough. Fortunately antiseptic methods have greatly limited the number of such cases, and they are now rarely met with.

Some cases are atypical. Some, as stated, run their course without fever; others progress in the usual way and then cease,—the abortive form,—even after the temperature has approximated 103° F. Such cases are not rare.

Attention called to the existence among children, of from four to eight years of age, of a form of gastro-enteritis which has exactly the course and gravity of a cholera infantum. It follows sometimes the ingestion of food bad in quality or improper for the age of the child, sometimes without known cause. It begins as a febrile indigestion, but suddenly diarrhœa begins, vomiting becomes uncontrollable, the facies of cholera appears, and the child dies in three or four days. Fever may be wanting from the beginning. Comby (*Méd. Mod.*, p. 689, Nov. 11, '96).

Etiology.—Any wound, no matter how diminutive, may become the starting-point of septicæmia. Hence the comparative frequency of this disease among surgeons who, through a scratch, a slight abrasion, or a post-mortem wound, due to a slight prick of the scalpel used, etc., introduce the virus into their organism. Healthy granulations were thought to be impermeable to toxic elements, but the experiments of Maas and Hack have shown this conclusion to be incorrect.

To affirm that the multiplication of bacteria through general infection is alone capable of causing septicæmia is not warranted by our present knowledge.

Toxins here, as in sapræmia, may, in addition to the rapid development of bacteria, act as a potent life-paralyzant. Indeed, experimental evidence tends to show, in the case of animals at least, that such is the case. Koch attributes the disease to a special coccus, Rosenbach to streptococci and staphylococci combined, and Besser to streptococci alone. It is probable, however, that a sharp line cannot here be drawn, since many instances are distinctly combined infections. A mixed infection is commonly observed in various diseases: in diphtheria, for instance. In some cases no trace of local infection can be found. The subject may or may not be in bad health, and general septicæmia develops and runs its regular course. Osler alludes to 21 such cases, 13 of which are due to streptococcus pyogenes, 2 to staphylococcus pyogenes, and 6 to pneumococcus. In 19 of these, however, the subjects were suffering from other diseases which were complicated with septicæmia. This is the *cryptogenetic* form of Leube. Cases due to bacillus pyocyaneus have also been described.

The micrococcus tetragenus of Gaffky is capable of causing general infections in man, as has been previously suspected from its pathogenicity in animals. Chauffard and Ramond (Archives de Méd. Expér., May, '96).

Literature of '97-'98-'99.

Case of septicæmia arising from tertiary syphilitic lesions. The so-called cases of "syphilitic cachexia" are similar, and should be called "secondary invasion of the organism by germs developed in syphilitic ulcerations." Quinine and salicylate of soda fail to act on the secondary septicæmia, but there is immediate improvement of this secondary condition when the primary cause is treated by antisiphilitic remedies. Surmont and Patoir (L'Echo Méd. du Nord, July 12, '97).

In eighteen cases of pyæmia and sepsis the so-called glycogen-reaction in the leucocytes of the blood noted. Experiments made to determine whether the appearance of the substance in the leucocytes is due to infiltration or to degeneration, and conclusion is reached that it is due to latter process. Kaminer (Berl. klin. Woch., Feb. 6, '99).

Pathology.—The most prominent morbid change is in the blood, which is thin and tar-like, in many cases acid, and frequently found to contain a large number of micro-organisms. The gastro-intestinal tract shows evidences of catarrhal inflammation, the mucous membrane being mottled and studded with hæmorrhagic areas varying in size and number. The lymphatic glands are usually more or less enlarged, the spleen likewise. Apart from these changes, there is little to attract attention. The kidneys are enlarged, the parenchyma is cloudy, the uriniferous tubules are inflamed, and their vessels contain pathogenic bacteria.

The changes in the blood are mainly due to the disintegration of the white corpuscles, and to a certain extent of the red through the influence of the toxins or of that of the micro-organisms themselves. These may be found in the remaining leucocytes, and so crowded are they sometimes that the corpuscles practically become masses of bacteria.

Prognosis.—The prognosis of septicæmia depends greatly upon the powers of resistance of the patient and the kind of micro-organism present. According to Settman (Münch. med. Woch., Jan. 15, '95), the most favorable prognosis can be established when staphylococci are found, less favorable if pneumococci are obtained, and least favorable if streptococci are present or in mixed infection. The bacteriological examination of the blood will furnish, in cryptogenetic

septicopyæmia, the source of infection. Thus, if we find pneumococci, the lungs are to be looked upon as the source of infection; if the bacterium coli, the intestines, biliary passages, or a cystitis.

When the source of infection—a large septic mass or an infecting surface, etc.—can be reached and judiciously treated, the chances are greatly improved and the symptoms sometimes improve immediately. This is especially the case in sapræmia; but, as it is always difficult to ascertain whether we are dealing with this form or the septicæmia, the information obtainable on this score is rather scant. The rapidity of the course affords some idea of the chances the patient has, and the prognosis may be said to be favorable if the symptoms show but slow aggravation. The rapid forms of septicæmia are invariably mortal. Important is the fact, already stated, that cases of “abortive” septicæmia are often met with, the symptoms receding after a short period of progress. In septicæmia occurring as a complication of coeliotomy the chances of recovery are very slight.

Treatment.—The proper observance of antiseptic surgery under all circumstances, whether the surgeon be dealing with a simple or severe wound, has remarkably diminished the cases of septicæmia. As soon as fever attends an injury or an operation, nowadays, suspicion is immediately aroused that a septic condition of the exposed surface has appeared. The sooner the wound is carefully examined and rendered absolutely aseptic, the better. This is best effected by means of a bichloride solution 1 to 1000, after carefully clearing of any discharge or blood that may be present. In injuries of the extremity, the latter may be left in a bath of borate of sodium, 20 grains to the ounce, for several hours,

if need be, after clearing and disinfecting the wound. Stitches should be removed in order to reach every sinus or cavity that may serve as a *nidus* for infectious agents. When a cavity cannot be reached conveniently, a syringe may be employed to wash it out. These measures are often sufficient in sapræmia to arrest at once the process; in septicæmia the result depends upon the promptness with which they are carried out.

If the dangerous, though apparently insignificant, wounds to which surgeons or anatomists are exposed were immediately treated as if they were snake-bites and thoroughly cauterized in the manner recommended in the last article much suffering would be saved them.

The medical treatment is of little avail; indeed, remedies tend more to debilitate the patient than otherwise. Important, however, is the use of heart-tonics, especially alcohol and digitalis, strychnine, and nutritious diet—all agents calculated to antagonize the general adynamia.

Intravenous injections of serum in post-operative septicæmia in two cases proved advantageous. Hayem's solution or simple salt water may be used in quantities varying from 25 to 38 fluidounces, and rarely as much as 64 fluidounces. It is of great importance to prevent the entrance of air into the vein. The artificial serum is an excellent resource, to which should be added all the others possible. Michaux (Le Bull. Méd., Jan. 12, '96).

Treatment of acute peritoneal septicæmia after abdominal operation is essentially prophylactic: to pay special attention to disinfection of the hands, to reduce manipulation as far as possible, and to keep the coils of intestine away from the area of operation. Drainage, either by gauze or an India-rubber tube, is of special importance, together with frequent aspiration of the fluid. If peritoneal septicæmia has developed, reopen-

ing of the wound does not give any prospect of success. Free purgation and frequent washing out of the bowel is advised. It is possible that injections of serum may be found useful. Hartmann (*Annales de Gynéc.*, Feb., '96).

Literature of '97-'98-'99.

Several cases of septic disease of the adnexa reported in which subcutaneous injections of saline solution were administered before and soon after operation, in quantities varying from 200 to 500 grammes. Injections of artificial serum possess great value in cases of general septic infection, especially at the onset of the disease. The circulation is regulated, the heart-action increased, and the cerebro-spinal system and nutritive functions are stimulated. Diuresis is increased within a few hours, but no appreciable amount of toxic matter is eliminated. Improvement in the general condition is to be ascribed to dilution of the toxins in the blood. This process of dilution should be continued as long as fresh toxins develop, by the gradual injection of moderate quantities of saline solution.

Intravenous injections should be reserved for cases in which a very rapid action is necessary. Mangin and Raynaud (*Wretch*, No. 26, '97).

1. If proper precautions are taken, the risks attending the use of serum may be neglected. 2. Although no streptococci may be found in the blood, benefit may attend the use of the serum. 3. In really serious septic cases, corrosive sublimate (1 to 2000), used fearlessly, is the only reliable antiseptic. 4. In septicæmia after labor the focus of mischief may be other than uterine. Arthur W. Sharp (*Brit. Med. Jour.*, Feb. 27, '97).

Experimental evidence is strongly in favor of the prophylactic action of injections of antistreptococcic serum; their use should not be confined to cases in which infection has already occurred, and it is in prophylaxis that they will be found most valuable, and especially in operations about the tongue or throat. Extensive operations will be far more feasible if the septic pneumonia and the diffuse septic processes so apt to follow them can be prevented by the prophylactic

use of antistreptococcic serum. Watson Cheyne (*Practitioner*, Apr., '97).

In septicæmia: 1. The yeast-nucleinic acid should be given at the earliest possible moment that septic infection is suspected. 2. The nuclein should always, in septicæmia at least, be given hypodermically if possible. If the 1-per-cent. solution is used, at least from 30 to 40 minims, undiluted, may be given every three or four hours. If the 5-per-cent. solution should be used, from 10 to 15 minims may be given every three or four hours, but ought to be diluted with distilled or at least with sterile water. 3. The injection region should be examined daily in order to determine if local action can have anything to do with the patient's increased temperature and pulse-rate. If it has, it is due to one of two things: either to insufficient dilution of the 5-per-cent. nuclein solution or to imperfect preparation of the skin or syringe. Walter Courtney (*Med. News*, Sept. 25, '97).

Treatment of septicæmia with antistreptococcic serum is difficult of application, since it is known that there are several races of streptococci, none of which affords products protective against the others. Until a serum can be injected which includes the products of each race, the success of the treatment will depend upon whether the organisms to be attacked are of the same race as those from which the serum injected has been derived. Leonard Wilde (*Lancet*, Feb. 11, '99).

Pyæmia.

Definition.—An intermittent febrile disease characterized by the formation of multiple metastatic abscesses in various parts of the system, and due to the absorption of pyogenic organisms.

Symptoms.—Since antiseptic methods have been generally used in surgery, pyæmia has greatly decreased. The cases seen in practice are usually due to careless dressing of wounds, generally by the patient himself, who only applies for treatment after the symptoms of general infection are well marked.

The initial symptoms, a chill more or less marked, slight fever, increased sensitiveness of the wound, usually come on a week or ten days after the injury was received: *i.e.*, when suppuration has been fully established. After this first chill, a period of quiescence occurs of perhaps an entire day and, as a rule, another chill occurs the second day, followed by another on the third, and so on, until the chill is observed to be irregularly periodical or intermittent: a characteristic manifestation of pyæmia. The same irregular intermittence is observable in the temperature-curve, which, after marked elevation,—104° F.,—suddenly falls to the normal or even below, remaining there until the next exacerbation. The intermissions vary in length—sufficiently long sometimes to suggest recovery. Suddenly another occurs, and another period of high temperature supervenes. The pulse does not follow the temperature; though its rapidity is increased when there is pyrexia, it is never normal as long as pyæmic infection is present.

The second period is that during which metastatic abscesses are formed. The lungs, the spleen, the liver, and the kidneys are the sites of predilection for these abscesses, the first two organs especially. A sharp pain in the side with dyspnœa—the attending signs roughly suggesting pleurisy, hæmoptysis, etc.—denotes that the lung has become the seat of the abscess, with perhaps septic effusion into the pleura. If the liver be invaded, jaundice, a common symptom in pyæmia, becomes marked, and the physical signs indicate hepatic involvement. Hæmaturia, the presence of many casts and much albumin in the urine, points to pyæmic nephritis. The brain may also be the seat of abscess, and show signs corresponding with the

region involved. The joints are not infrequently the seat of abscesses, and the parotid gland also.

The general symptoms are characteristic and unlike those of septicæmia. The mental condition, unless a brain-abscess develops, is totally different; instead of apathy, there is usually clear perception of suffering, which may become quite severe through the involvement of nerves and joints in the inflammatory process. The skin is usually dark or yellowish and erythematous, and sometimes pustular eruptions may greatly increase the discomfort. The tongue is thickly furred. Marked weakness, emaciation, and exhaustion are the rule, especially in cases of long duration. In the later stages delirium may appear, especially in acute cases; followed by coma.

Etiology and Pathology.—Pyæmia has been found by Koch to be due mainly to chain-like cocci, which cause the blood-corpuscles to become agglutinated in masses, which then form thrombi. On the other hand, staphylococci and streptococci have also been found capable of inducing metastatic abscess. The barrier between septicæmia and pyæmia, therefore, is not, to say the least, solidly established, and many authors now combine the two conditions under the name "septicopyæmia." Ogston has shown, however, that the cocci more readily enter the circulation, whereas streptococci and staphylococci, even when present through a septic state of the wound, only penetrate the barrier of granulation tissue when in great numbers.

The chain-cocci enter the circulation, especially the veins, and, meeting here and there suitable surfaces, roughened, perhaps, through slight fibrosis, etc., form parietal thrombi of agglutinated corpuscles and cause local inflammation

and suppuration of the vascular walls. From these preliminary foci more or less large suppurating thrombi are swept away by the blood-current, and, being thus transported to distant organs, there originate purulent processes. The toxins of sapræmia or the micro-organisms of septicæmia when present are complicating features. The lymphatic system may also act as a channel for the transportation of cocci-laden thrombi.

The micro-organisms are to be found, not only in the white corpuscles, but also in the plasma and where metastatic abscesses have been formed,—in the lungs, pleura, pericardium, endocardium, the spleen, the kidneys, the brain, the joints, etc.,—a feature of the disease which explains the great variety of symptoms witnessed.

The wound usually has a characteristic appearance and odor. It appears grayish, greenish, or black. The surrounding veins are often found to contain suppurating thrombi, which in advanced cases may occupy the whole length of the venous trunk involved. In the joints the synovial membrane is at first merely congested, then suppuration ensues; as in other forms of arthritis, the knee is a preferred site in pyæmia, the shoulder being next in order.

Prognosis.—The course of the disease varies greatly, and it may last from a week to several months. The prognosis of the disease is very unfavorable, however, and but a small proportion of cases recover. When the intervals between the chills are short and the metastases are numerous or involve important organs, the likelihood of an early fatal ending is great. The disease is often linked with septicæmia, the manifestations of both forms being mingled, and the progress of the case toward a fatal

ending is correspondingly hastened. Erysipelas has also been observed as an accompaniment of pyæmia, and also reduces the slight chances of recovery.

In the form of pyæmia attending gonorrhœa the morbid processes caused by the gonococcus do not vary greatly from those caused by pus-cocci. E. Finger (Wiener med. Woch., p. 248, '96) found that the behavior of the gonococci in and toward the affected tissues, however, differs from that of the pus-cocci, in that the latter rapidly permeate the tissues and cause rapid breaking down of the same, while the gonococcus is less active and takes only paths of least resistance through the fissures and lacunæ of the epithelium and connective tissue. Again, the reaction of the tissues is somewhat different. The inflammation caused by the gonococcus is entirely purulent; the formation of granulation tissue is early and abundant. The gonorrhœal process tends to the formation of connective tissue and scars,—in the urethra as stricture, in the prostate as destruction of the gland, in the suprarenals as thickening of the organs, and in the joints as ankylosis. Finally, the gonococcus is destroyed when exposed to a temperature of 103° or 104° F. for several hours, while the pus-cocci are far less susceptible to such a temperature. From these considerations it follows that the gonococcus is less energetic in its action and is more easily destroyed than the pus-cocci, and that the lesions produced by the former tend to run toward recovery more readily than those produced by the latter.

Treatment.—The primary indications here are precisely those enumerated under septicæmia. More can be done, however, if the case is seen early. The thrombi being transported by the venous

current and the early venous abscesses beginning close to the infectious wound, disinfection of the interior of the proximate part of the veins may arrest further progress. A solution of mercuric bichloride, 1 to 2000, may be used for this purpose. If this cannot be done, a ligature may be placed around the suspected vessel some distance above. Amputation performed early sometimes saves the case; it is fully warranted when the diagnosis is positive and the course of the disease is unfavorable. The medicinal and dietetic treatment is that outlined under SEPTICÆMIA.

An important measure in pyæmia is the prevention of bed-sores, which readily form when the patient is allowed to remain in bed. He should be placed on air- or water- cushions; his position should frequently be changed, and the parts compressed should often be bathed with camphorated alcohol. Such a case is a source of infection for wounds in other patients, and should therefore be isolated—preferably in a tent exposed to the sun's rays and allowing a free circulation of air.

Gangrene.

Definition.—This term is usually attributed to death or mortification of soft tissues, while the term "necrosis" is reserved for death of osseous or cartilaginous tissues.

Varieties.—Gangrene is divisible into several varieties: *moist gangrene*, due to arrest of the vascular supply, and in which the parts are soft and pulpy; *dry*, or *senile gangrene*, or mummification occurring in old age, in which the tissues become leather-like and wrinkled; *spontaneous gangrene*, a relatively rare form affecting the extremities and observed in apparently strong and young subjects; *ergot gangrene*, which occurs in individuals who, in consuming rye or rye-bread,

become exposed to ergot of rye; *diabetic gangrene*, which occurs as a complication of advanced diabetes; *pressure gangrene*, due to pressure and which occurs occasionally as a complication of bed-sores; and *symmetrical gangrene*, or Raynaud's disease, a paroxysmal form affecting mainly the tips of the fingers and toes.

Symptoms.—The symptoms vary greatly according to the primary pathogenic factor and to a degree upon the location of the gangrenous process.

MOIST GANGRENE.—This variety is that most frequently met, owing to its frequent occurrence as a result of accidents, irreducible hernia, etc. Being due to arrest of the blood, both in the arteries and veins, there is softening, or liquefaction. The tissues assume various shades, varying from bluish green, red, to black; and blebs containing a very foul and fœtid liquid are formed, the mortifying tissues giving off gases composed mainly of sulphide of hydrogen, ammonia, and volatile fatty acids. This form is likely to occur after severe injuries, such as crushing, burning, or even frost-bite. It is also observed when open wounds have been exposed to infection through imperfect or uncleanly dressings. A form of moist gangrene, also of traumatic origin, is sometimes witnessed after a large vascular trunk has been destroyed, which may spread with great rapidity.

In an average case the gangrenous area undergoes, as stated, a characteristic change of color. At first the boundary-line between the dead tissues and the living ones is imperfectly marked. Where the progress of the necrotic process is arrested, however, through the vital resistance of the tissues, an area of inflammation interposes itself as a protecting wall, which becomes more or less perfect as the granulation tissue

formed is healthy. This constitutes the *line of demarkation*. The inflammatory process continuing beyond, suppuration ensues, and the dead tissues may thus be entirely separated from the living ones through Nature's efforts. The inflamed area is distinguishable from the healthy or gangrenous ones by its bright-red color, which changes to blue or black in the direction of the dead tissues. Unfortunately Nature's efforts do not always succeed, and the morbid process may penetrate the limiting barrier, and invade the tissues beyond, extending gradually until death ensues.

Literature of '97-'98-'99.

A green color is not always indicative of gangrene of the intestine. Case of eight-day incarcerated-hernia loop in which a "fine-green Florentine-bronze color" had appeared. The loop was not reduced and the patient died four hours later, when tests of the green portion proved that it was not gangrenous. The portion of the intestine was filled with water at a strong pressure, and only an apparently sound part split. The intestine can be colored green with bile alone, and a light-green color does not necessarily imply any alteration in the intestinal wall. A yellow-green, dark, black, or bottle-green are of worse significance, but at the same time they do not necessarily indicate a serious deterioration in the intestinal wall. Begoin (Centralb. f. Chir., Dec. 2, '98).

The constitutional symptoms depend upon the amount of tissue involved. At first when an extremity is affected there may be but slight general disturbance; when, however, the gangrene ascends the limb, fever and other evidences of toxæmia appear.

The extension of gangrene depends to a great degree upon the nature of the cause and the general health of the patient. An injury, which, through interruption of the circulation, is followed

by gangrene, often remains circumscribed to the region in which the blood-flow has been reduced or arrested, provided, however, the general condition of the patient is favorable. Persons in poor health, or individuals who have lowered their vital powers by the excessive use of alcohol, overwork, insufficient food, etc., however, are much more exposed to extension of the gangrenous process.

Case of *gangrène foudroyante* of the external genitals observed in a hard drinker without other known cause. Recovery followed. Alcoholism seems to be one of the prominent causes. Oltramare (Revue Méd. de la Suisse Rom., Apr. '88).

Complications incident upon the destructive nature of gangrene usually lie behind a fatal issue, when this occurs. An artery may be eroded, giving rise to mortal hæmorrhage; pyæmia and septicæmia through penetration into the blood of pyogenic micro-organisms or their toxins, peritonitis through extension of the gangrenous process from a gangrenous hernia, etc., may be mentioned among the many death-producing conditions which can appear.

In the cases previously alluded to, in which gangrene spreads with great rapidity, the so-called *traumatic gangrene*, the blood-supply is not only interrupted, from an extremity, but there is septic infection besides. In a few hours in such cases the gangrene may have spread up an entire extremity through the agency of infectious bacteria. The skin becomes brownish red, black, or green; gas is rapidly formed, and the patient quickly succumbs to acute septicæmia, unless amputation has promptly relieved him of the source of infection. The term "traumatic" is inapplicable to such cases, because it implies that this viru-

lent form of the disease is to be expected after traumatism.

Literature of '97-'98-'99.

The characteristic by which traumatic gangrene is most readily recognized is the subcutaneous development of gas. W. Evans (*Lancet*, Jan. 22, '98).

In truth, gangrene seldom occurs nowadays owing to modern methods, and, even in severe injuries of an extremity witnessed in the average hospital case, separation of the dead tissues soon occurs. Strict antisepsis in all surgical procedures adopted greatly limits the likelihood that a dangerous form of gangrene will appear. Yet even slight exposure of a wound to infection may be followed in suitable environment by an active necrotic process endangering the life of the patient.

In DRY GANGRENE, of which senile gangrene is a type, there is a distinct absence of fluids, and the process of mortification is more a metamorphosis into an inorganic mass than a true decomposition; hence the term "mummification" frequently applied to this form. The local blood-supply gradually diminishes, the tissues shrink, become dark brown or black, wrinkled, and the skin becomes leathery. It usually affects the toes, sometimes the fingers, and may spread to the plantar or palmar surfaces.

Literature of '97-'98-'99.

Remarkable case of twin labor described where one twin was flattened and macerated, while the other had gangrene of the leg from constriction.

Though the infant lived but sixty-five hours, all the more prominent symptoms of dry gangrene became well established. Stolz (*Wiener klin. Woch.*, Jan. 6, '98).

SPONTANEOUS GANGRENE is rarely observed. It may be met with in subjects who apparently are in excellent health,

but affected, as autopsies have shown, by arteriosclerosis. The arteries are narrowed, and thrombi are sometimes widely disseminated through the affected limb. This renders spontaneous gangrene particularly malignant, and amputation of the limb is often necessary, preferably above the knee. Unlike other varieties, it gives rise to acute suffering, owing to involvement of the local nervous supply, the principal branches of which are often found greatly thickened. Spontaneous resolution is rarely observed in this form.

Form of gangrene which is comparatively common in Japan. It begins spontaneously in the form of fissures or ulcers of the toes, then advances slowly until a line of demarkation is formed between the sound and diseased tissue. In some cases the gangrene heals under suitable treatment; in others it advances continuously and extends to the thigh. Thirty-four cases, of which only one was in a woman. The disease was most frequent between thirty-eight and forty-seven years, showing a marked difference from senile gangrene. In all of the cases the radial pulse was hard and difficult to feel. The most important lesions in the examination of the tissues were found in the arteries of the part, namely, obliterating endarteritis; or an organized thrombus. In nine of the cases, along with the obliterating endarteritis, there was a cellular infiltration in the tissues, which he regarded as showing the syphilitic character of the process. Haga (*Virchow's Archiv*, clii).

ERGOT GANGRENE is also partly of neurotic origin, the main pathological factor being vasomotor spasm brought on by the ingestion of ergot of rye when rye-flour is used instead of wheat-flour in making bread, as is the case in many parts of Europe. The continued consumption of ergot of rye gives rise to various preliminary symptoms: general adynamia, gastric disorders, formication, and fugitive pains. The arrest of the

blood-current through the spasmodic contractions of the arteries is soon followed by blanching and lowered nutrition, which makes the part vulnerable to the least traumatism. Even without such, the ill-nourished areas farthest from the centre—the toes, the ears, the nose, etc.—finally succumb.

DIABETIC GANGRENE.—Gangrene is rather frequently observed in diabetics, especially in persons advanced in years. Heidenhain attributes it to the common cause of senile gangrene, arteriosclerosis; the main factor he believes to be an abnormal susceptibility to wound infection. Still, the fact that internal viscera sometimes become gangrenous in such cases would tend to invalidate this view. In a case witnessed by Turner the pyramids of the left kidneys were found gangrenous. A marked line of separation existed, and every other portion of the organ was healthy, as was also the entire urinary system.

PRESSURE GANGRENE.—This occurs when a region in a low state of vitality—such as occurs in prolonged fevers, etc.—is submitted to continued pressure. The vascular supply, already weakened, becomes further weakened, especially when, as is the case over the sacrum, the scapula, etc., the soft tissues are pinched, as it were, between a bone and the bed. The slightest injury over such a site becomes the seat of ulceration, the so-called “bed-sores,” and gangrene is apt to follow, if through the presence of arteriosclerosis and old age the lumen of the vessels is already limited.

Literature of '97-'98-'99.

Gangrene of the genitals following forceps application for deformed pelvis; recovery. F. Bruschi (Arch. di Ostet. e Ginec., July, '97).

Case in which death from septicæmia followed the ritual operation at the

hands of the *mohel*. Circumcision was done on the tenth day. Several hours after the operation severe hæmorrhage occurred, which was checked after considerable labor, by the religious operator. Forty-eight hours later the author found the anterior portion of the penis in a condition of dry gangrene, the cause of which was discovered to be a narrow strip of gauze, evidently saturated with some styptic, and tightly constricting the organ. Death occurred on the thirteenth day after the operation. Brothers (Med. Record, Jan. 30, '97).

SYMMETRICAL GANGRENE, or Raynaud's disease, is a form which occurs in paroxysms. It begins with paræsthesia and sharp pains. The tips of the fingers and toes, the parts most frequently affected, then become cyanotic and gangrenous. The entire phalanx is occasionally involved. It is occasionally observed in other parts of the body, the unaffected surfaces being usually very pale.

Man, aged 35 years, for ten years had symmetrical gangrene, beginning in the toes. Later, the skin over the feet became livid and discolored. Death took place with symptoms of apoplexy. Autopsy showed hæmorrhage in the left lateral ventricle and extensive and severe arteriosclerosis. The arteries of the legs were especially affected. Thiersch (Münch. med. Woch., No. 48, '95).

CARBOLIC-ACID GANGRENE.—Carbolic acid has caused gangrene in so many cases that it seems to merit a special place among chemical agents capable of inducing this condition. Even in 2-per-cent. solution, this agent is capable of destroying the life of tissues. The majority of cases reported in which gangrene occurs were felons or slight disorders of the finger-tips or toes. According to Czerny (Münch. med. Woch., Apr. 20, '97), the duration of the application is more important than the strength of the solution, the anæsthetic

action of the drug causing it to be left *in situ* prolonged periods at a time. The parts first become grayish white and eventually black. There is no pain, and the gangrene is only revealed by the appearance and the stiffness of the finger or toe affected.

Three cases in which applications of carbolic acid resulted in gangrene. A 2-per-cent. solution of carbolic acid can have a deleterious influence. Leusser (Münch. med. Woch., No. 15, '96).

Literature of '97-'98-'99.

Case of disseminated gangrene of skin due to iodide of potassium. The ulcers were sharp-cut with slightly-elevated borders. The mucous membranes were unaffected. The urine contained neither sugar nor albumin, but the patient's general health was bad. Audry (Annales de Derm. et de Syph., No. 11, '97).

Etiology and Pathology.—The causes of tissue-death are divided by Tillmans ("Surgical Pathology," Rogers's transl.) into four general classes: 1. Interruption of the afferent flow of arterial blood without the development of a collateral circulation, such as may occur in the cases of thrombosis and embolism, or after ligation, or in consequence of the pressure of a tumor or inflammatory exudate. 2. Interruption of the efferent flow of venous blood. 3. Interruption or stasis of the circulation in the capillary walls. 4. Death of the tissue-cells without any disturbance of circulation, due to poison, such as snake-bites, or to micro-organisms or the products of their metabolism, such as are found in infectious diseases of wounds; for example, erysipelas, cellulitis, and septicæmia.

Local and general anæmia, venous stasis, disturbances of circulation from diseases of the vessels,—heart or lungs,—or disturbances of circulation due to inflammation—in short, faulty circula-

tion from any cause—increase the disposition to gangrene from the effects of chemical or thermal influences.

The special etiological factors have been already alluded to, while gangrene as a complication of various infectious diseases has been reviewed in the respective articles upon the latter.

Case of gangrene of the foot noted during the course of an attack of influenza complicated by acute nephritis. Upon amputation, the arteries were found occluded by thrombi. Johannsen (St. Petersberger med. Woch., No. 46, '90).

Two cases of gangrene observed following measles in children. In the first case the mouth became sore and later gangrenous. In the second case the right side of the vulva was found covered with a dark, gangrenous spot, the size of a half-dollar, involving the right labia majora and minora, the clitoris, and the vagina in the region of the meatus urinaris. Death occurred in both cases. G. E. Lochner (Albany Med. Annals, Apr. 4, '96).

Case of gangrene of the external ear and face on the left side which occurred in a child of 1 year affected with severe pertussis. Death occurred on the sixteenth day. The necropsy showed the existence of an abscess between the bone and periosteum in the middle fossa of the cranium, on the left side. Peck (Archives of Ped., vol. xiii, No. 4).

Case of gangrene of the leg following typhoid fever. This is believed to be a case of primitive arteritis from the typhoid bacillus, analogous to the cases described by Rattone with formation of secondary phlebitis, periarteritis, and bacillary abscess. D. A. Hodghead (Gaz. Med. di Torino; Pacific Med. Jour., Jan., '96).

Literature of '97-'98-'99.

Case of a girl, aged 2 years, who, on the tenth day of an attack of measles, presented a *plaque* of gangrene the size of the palm of the hand upon the right lateral aspect of the thorax below the axilla. The periosteum of the subjacent

ribs was laid bare, with a part of the great pectoral muscle. Cure resulted without functional impairment after a large abscess had developed in the internal aspect of the arm facing the gangrenous area. The author attributes the localization of gangrene to the habit which the child had of lying on its right side. The compression had produced thrombosis of the long thoracic artery, with consequent gangrene of the tissues, whose power of resistance had been weakened by the disease. Wunder (Münch. med. Woch., No. 20, S. 536, '97).

Case of symmetrical gangrene produced by embolism of one iliac artery. Patient died on the twenty-eighth day.

In the left common iliac artery was an embolus adherent to the internal coat, which appeared normal. Secondary but non-adherent clots were prolonged downward into the internal and external iliac, the femoral, and the deep femoral arteries. A secondary clot ascended to the bifurcation of the aorta and then descended in the right iliac and femoral arteries. All the secondary clots were soft and non-adherent; those on the right side especially floated in the arteries which they did not fill. The left kidney and the spleen were full of infarcts of the same nature as the iliac embolus. Vidal and Nobécourt (Lancet, Apr. 16, '98).

Case of multiple gangrene of the skin in a nervous, anæmic girl, 21 years of age. After a burn upon the left hand a vesicular eruption attended by severe stinging pain appeared, at first limited to the left arm, but later distributed over the whole body. With the evacuation of the contents of the vesicles upon the left arm discoloration occurred, and an eschar formed which fell off after a considerable time. The defect healed with the formation of scar keloid. Upon other portions of the body the blebs were tensely filled with pure serum or serum and blood, and ruptured after a short time, laying bare the corium; these healed by granulation without the formation of an eschar. After several outbreaks recovery took place, the affection having lasted over a year. The nervous system plays an important rôle in the disease, which depends

upon a trophoneurotic process. Hintner (Archiv f. Derm. u. Syph., B. 38, H. 2, '97).

Rapidly-spreading gangrene, the *gangrène foudroyante* of French surgeons, is developed when to a necrotic process in the economy there is added a rapidly-spreading emphysematous condition of the surrounding parts, with increased tension, crepitation, the formation of gaseous bullæ, and a bronzed and streaky discoloration of the skin. The disease, once established, tends to spread rapidly to other parts of the body, and constitutes the most fatal form of gangrenous trouble.

Infectious gangrene of the skin is occasionally observed. According to Cailaud (Rev. Mens. des Mal. de l'Enfance, Jan. and Mar., '97), this appears under two conditions: There may be a previous ulcerative skin-lesion, from and upon which the gangrene starts, or the gangrene may appear immediately after a non-ulcerative manifestation of the skin; it is not an occasional accident, but constitutes an essential element of the disease. Any cause which impairs general health predisposes to that contagious affection, and existing ulcerations and erosions serve as a door of entrance for the contagion.

Spreading traumatic gangrene, though usually developed in subjects suffering from general depraved health, occasionally occurs in healthy subjects through infection of the wound by the anaërobic bacillus of malignant œdema of animals, and to which fowls are particularly susceptible. Through the experimental observations of Chauveau and Arloing, Brieger, Ehrlich, and others, the fact has been practically established that the same germ, which, on the one hand, may give rise in animals to malignant œdema, may, on the other, when ingrafted in

man on tissue the seat of a moist gangrene, produce the emphysematous condition.

In the field-mouse, an animal immune to the bacillus of septicæmia, Koch has produced, experimentally, a progressive gangrene from inoculations with chain micrococci not to be distinguished from the streptococcus pyogenes. He has also shown that the ptomainic products of bacterial activity may themselves cause the destruction of tissue, since, in the examination of specimens from the inoculated animals, the progressive necrosis was observed markedly in advance of the bacterial invasion.

Literature of '97-'98-'99.

Case of gaseous gangrene complicating a compound fracture of the right forearm in a boy of 10 years, the bones coming in contact with mud. For the first two days the patient did well, then the arm began to swell and became rapidly emphysematous and gangrenous, with a line of demarkation an inch above the elbow; the swelling was dusky in color and there was crepitation extending over the scapula and below the clavicle. Several long incisions were made along the forearm and gas escaped with great force. Antiseptic measures were carried out and the condition of the arm rapidly improved, probably because of the relief from pressure on the blood-vessels by the gas. Amputation at the junction of the upper and middle third of the arm was necessary, however. The condition is believed to have resulted from infection with the bacillus *aërogenes capsulatus*, but no bacteriological examination is reported. Reports of 16 cases of infection by this micro-organism in literature, with 12 deaths and 4 recoveries found. C. P. Gildersleeve (Med. Record, Mar. 4, '99).

Treatment.—Removal of the causative factors and especially those interfering with free circulation is the first indication. In strangulated hernia—for instance, section of the constricting ring—

this aim can be reached; in paraphimosis, pressure from superficial tumors, bed-sores, tight bandages, etc., relief can be afforded in this way. In many cases, however, this resource is not available. In obstruction due to thrombosis and arteriosclerosis, for example, all that can be done is to facilitate the return of the blood by judicious procedures. Elevation of the part, with slight flexion of the extremity affected, gentle massage toward the heart, warmth, taking care to avoid "hot-bottle burns," which under such circumstances are easily inflicted, represent the minor indications.

When, notwithstanding prophylactic measures, the gangrenous process develops, disinfection of the area should at once begin. Iodoform, orthoform, aristol, and resorcin are valuable in this connection.

In a case of hospital gangrene in a young girl, resulting from ulcerations of the leg, applications of resorcin produced excellent results, in solutions of the strength of 1 in 50. Hallopeau (*Semaine Méd.*, June 11, '92).

Case of hospital gangrene cured by the application of bandages soaked in camphorated ether. M. A. Coyon (*Ann. de l'Inst. Pasteur*, Nov., '96).

The next object is to prevent infection of the healthy tissues beyond by products of decomposition. Any accumulation of offensive fluid or gas should be prevented by evacuating foci and treating the part with antiseptic lotions. An excellent agent in this connection is permanganate of potassium in 1-grain-to-the-ounce solution. Infiltrating abscesses should be followed up to the living tissues above, if needed, to thoroughly clear them of the infecting elements. Carbolic acid should not be used as a disinfectant, since it tends to lower the vital resistance of the tissues.

The adoption of radical measures must

be regulated by the progress of the case and the nature of the primary disorder present.

When *amputation* is determined upon, the anatomical distribution of the vascular supply of the part must clearly be borne in mind and an effort made to leave in the flaps, not only unobstructed vessels, if arteriosclerosis or thrombosis be present, but also a sufficient supply to insure proper nutrition. Stephen Smith, of New York (Phila. Med. Jour., Oct. 29, '98), recommends the following amputation when gangrene of the foot is present, and when it is decided to amputate at the knee or through the thigh. There being eight arterial branches in this region, if the incisions and flaps are suitably planned this arterial supply need not be seriously interfered with. His method of amputation is as follows: A straight incision is made from two inches above the upper border of the patella downward over the centre of that bone to the tuberosity of the tibia. From the lower extremity of this perpendicular incision two curved incisions are made, having their convexity downward, and extending, respectively, in the direction of the external and internal borders of the limb. These two incisions having been united posteriorly by a straight incision across the upper border of the calf, the flaps are dissected up from the tibia and fibula, the patella is removed, and the knee-joint is disarticulated.

It is generally thought advisable not to interfere with the reparative efforts of Nature when the line of demarkation is clearly established. When, however, in the case of an extremity, there is no line and the morbid process ascends here and there or evenly and the patient shows evidences of impending constitutional disturbances, the question of am-

putation is in order. In arriving at a decision in this connection the various reasons for an amputation should be carefully computed, namely: The nature of the causative disorder; the probabilities as to spontaneous resolution; the subsequent deformity involved, both without and with amputation based upon the parts (muscles, nerves, vessels) already destroyed; and last, but not least, the general health of the patient. These may all prove useful in case of subsequent controversy. Severe injuries followed by gangrene warrant amputation if the tendency to spread is evident. When a putrescent mass, however, though the line of demarkation be present, exposes the patient to general toxæmia, amputation is also warranted as soon as the signs of septicæmia appear. Especially is this true in "traumatic gangrene."

All surgeons agree that a high amputation is to be preferred, and the knee or thigh is usually selected because the profunda femoris is rarely obstructed by thrombi.

In SENILE GANGRENE a conservative line of treatment is indicated, since meddlesome surgery here is liable to be followed by extension of the morbid process. Attention to the healthy tissues of the entire surface is necessary, since a minute abrasion, a slight blow, may become a gangrenous area. As taught by Thomas Jones (Med. Chronicle, Jan., '98), when the gangrene is limited to one or two toes and the patient's condition is satisfactory, the surgeon should be content with the expectant plan of treatment, taking precautions to lessen or prevent the effects of local septic infection. When, however, the gangrene has reached the metatarsus, he should be prepared to perform the high operation; that is, amputation

above the knee. The local treatment in limited forms of gangrene should consist in thorough cleansing of the foot and leg, free dusting of the immediate vicinity of the dead part with iodoform, and the application over this powder of sublimate or salicylic wool. The use of artificial heat in the form of poultices and fomentations is positively mischievous. Pain may be relieved by the internal administration of opium and the local application of a powder composed of boric acid, sublimate of bismuth, and hydrochlorate of morphine.

In the treatment of DIABETIC GANGRENE no special features are indicated. Heidenhain, who has given the subject special attention, states that, as in senile gangrene, as long as the gangrene is confined to one or two toes the line of demarkation should be awaited and the dead tissues allowed to separate of themselves. Removal of the gangrenous portion with forceps and scissors may lead to gangrene of the parts above, although the line of demarkation has been fully established. As soon, however, as the gangrene attacks the sole or the dorsum of the foot, an amputation of the thigh should be made as close above the

condyles as possible. Amputation below the knee is nearly always followed by gangrene of the flaps. In 11 cases of diabetic gangrene 6 were saved by thigh amputation. Two of the 3 fatal cases had large quantities of sugar in the urine (8 per cent. and 5 per cent.), while the remaining 2 showed much albumin in addition to sugar. Such cases should avoid even insignificant injuries, which in them may assume serious proportions—precisely as in senile gangrene.

SYMMETRICAL GANGRENE rarely calls for surgical interference. The treatment of the neurosis and constitutional measures are generally sufficient, and has been described elsewhere.

CONSTITUTIONAL MEASURES. — These should not be neglected. Nutrition should receive especial care, and the patient should be supplied with nourishing food. The low diet which older ideas seemed to warrant belongs to the past. Alcoholic stimulants should be given, but in small quantities at a time—just enough to sustain normal cardiac action. Strychnine is a valuable adjuvant, by stimulating vasomotor action. Promiscuous drugging should be avoided.

Y

YELLOW FEVER.

Symptoms. — The symptomatology as here given was studied by Dr. Murray, of the Marine-Hospital Service.

The patient may complain of having sickened in the night or early morning, and of headache and malaise, with some gastric distress. A chill sufficiently severe to be alluded to is rare, but chilliness is usually complained of. Distress in the early morning is a rule. Failure to eat a good breakfast is a bad omen, but it suggests a mild case. Fever of

101° to 103°, with pulse of 110 to 120; cutting pain through the forehead, with aching eyes; fullness of eyes with some pain and suffusion, generally with injection, are probable signs. The back and thighs are painful in a severe case; there is some soreness in the mildest cases. Severer cases will have pain in *back* of neck and in calves.

By pressing firmly and deeply over the region of the gall-bladder, one will generally elicit a noise resembling a squeak. The face is full and less mobile

than in health, with a fullness of the upper lip.

[Passed Assistant Surgeon White reports that he made two diagnoses with the swollen upper lip as the first noticeable symptom.]

The cheeks are more or less dusky, the hue depending also on the patient's color; they are sometimes faintly purplish. Sweating diminishes these facial signs in a few hours. There is congestion of the sclerotics, which increases, until after thirty-six hours, when they tend to become yellowish; in children, the eyes remain pearly. Frequently pressure on the eyeballs will cause pain, especially in bad cases. Primary complete constipation or semiconstipation is always present.

The superficial circulation is abnormal and sluggish; the skin may be streaked by passing the finger over it or paled for a quarter of a minute by pinching; this is a good sign, especially after the disease has progressed thirty-six hours. The skin is moist, as a rule, and kept so to the end, whether drugs are given or not. Yellowness of the skin is not to be looked for early. Unless there is nausea or headache, the patient lies quietly.

There is less rapidity of pulse than the febrile condition present warrants, judging from lung disorders and enteric fever. An inveterate smoker's pulse may become reduced when the amount of tobacco used is also reduced. After $2\frac{1}{2}$ or 3 days the pulse falls below 70 and later on lower yet; fright and irritation cause the slowness to pass unobserved. The pulse should be counted without the patient's knowledge.

The above signs are sufficient to warrant isolation, the disinfection of all discharges, the clothing and bedclothing being discarded, even if there is no known fever within a thousand miles.

After sixty hours there should be some albumin in the urine, but it may be absent. Anuria may exist, but in women is not reliable, while in children it is sometimes difficult to obtain. Albumin should not be confounded with mucin. Other symptoms should not be treated lightly because no albumin is found in the urine.

At this stage some brown mucus, or black discharges, or "bismuth" stools may be looked for: early in mild cases—late sometimes in severe ones. This is only confirmatory evidence, however. Mild cases suffer from distaste for usual food only, and, of course, there is anorexia from the beginning. The vomiting of the last food taken is usual, and bile is voided early if the early nausea is not checked, but no bile will be vomited during the thirty-six hours, following proper bowel movements.

After vomiting the last food taken and a little bile, the vomit usually becomes white, and remains so until blood oozes into the duodenum or stomach: the source of the black vomiting. Hiccough and retching appear, and the black fluid may be heard regurgitating through the pylorus into the stomach.

[The gravest two symptoms that can arise during the course of a case of yellow fever are undoubtedly black vomit and suppression of urine. Black vomit is caused by rupture of walls of capillaries or venous and arterial radicles, and the discharge of blood into the cavity of the stomach, where, coming into contact with hyperacid gastric juice, it becomes altered into small masses of brownish-black color, somewhat resembling coffee grounds in gross appearance. Its advent may also indicate a general hemorrhagic diathesis, which may be manifested by hemorrhages from the nose, gums, fauces, rectum, or by extravasations into the connective tissue of the scrotum. The abrupt appearance of black vomit in large quantities without

warning is unusual. Careful search will often show minute brown or black particles floating in clear fluid, and presenting the appearance described by some authors as "bee's or butterfly wings." It is not uncommon, however, that patients just before death should vomit a large quantity of black vomit, and that after death the stomach should be found to contain several quarts of the fluid. It would seem probable that in these cases the hæmorrhage which produces it was more of an active hæmorrhage than a capillary oozing, and that death comes quickly as the result of shock. H. D. GEDDINGS, U. S. M. H. S.]

FULMINANT CASES.— Sometimes the symptoms appear in such quick succession that we think the attack is necessarily fatal. Often in such cases we have no chance to ask the patient how matters fared with him twenty-four or thirty-six hours before. Walking cases are as common in this as in the other bed diseases. The case of a man may be reported who suffered from headache for three days while on duty, black vomit occurring while he was on the stairs on the way to his death-bed.

Diagnosis.— The diagnosis of yellow fever as here presented was obtained from a report by Dr. John Guitéras, formerly of the U. S. Marine-Hospital Service.

The diagnosis of individual cases of yellow fever is very easy. There is no acute febrile disease in which there are as many signs that may be called pathognomonic. The diagnosis of the disease rests upon three such symptoms, namely: the facies, the albuminuria, and the want of correlation between the pulse and temperature. The facies are extremely characteristic, but it is well not to announce officially the existence of yellow fever until the presence of albumin in the urine is shown.

FACE.— The appearance of the face is that of typhus fever during the first

forty-eight hours of this disease or like that of measles before the eruption breaks out, with a more or less pronounced icteroid hue. It is the latter feature which gives the face its characteristic appearance. In the first twenty-four or forty-eight hours it is by no means a distinct jaundice. It is, of course, best noted in the sclerotics, but is hidden by the marked injection of the smaller vessels. The icteroid hue is often better seen at some distance from the patient than when the eye is closely inspected. It seems to show itself in waves with the different movements of the eye. Possibly this is the result of transient contraction of the vessels of the conjunctiva or of the different angles of reflection of the light upon the eyeball. In severe cases, and on the second and third day of the disease, the jaundice becomes more prominent. It will show itself in distinct waves as the capillaries of the skin contract with the movements of the facial muscles or it may be brought out by taking up a fold of the skin between the fingers, when the contrast between the yellowish, anæmic skin and the surrounding congested areas will become well marked. Later on there may be well-marked jaundice. By this time usually the florid color of the face has been replaced by a more dusky hue. In the later stages of the disease there are also characteristic features of the facies in grave cases. The mind is usually clear, and there is a peculiar alertness and watchfulness that is not seen in other acute febrile diseases.

ALBUMIN.— The albumin appears in the urine usually on the third or fourth day of the disease. It may be very transient albuminuria. In many mild cases the albumin is present only in the urine passed in the evening of the third or

fourth day. In many cases it is only a trace, but even then by a careful centrifugation granular casts may be found. In severe cases the quantity of albumin may be very great and the different forms of casts characteristic of acute parenchymatous nephritis are found in abundance. Now, there are many acute febrile diseases in which albumin may be found in the urine, but in none of them so constantly nor so early when in connection with such mild manifestation of the toxæmia. In all such diseases the albuminuria will be found at the end of the first week or during the second week, and as an evidence of persistent high temperature and intense toxæmia. Cases of yellow fever corresponding in intensity with these present, at the same time, such characteristic features that it is impossible to mistake them. The difficulty of diagnosis can only be met with in connection with mild cases.

PULSE AND TEMPERATURE.—The third characteristic symptom of yellow fever is the want of correlation between the pulse and the temperature. This may be a rather late manifestation and may be absent, especially in children. It should be remembered that the characteristic feature of yellow fever in this connection is not a slow pulse during the convalescence or even during the defervescence of the fever. The characteristic feature is that quite often we find that at the same time that the temperature may be rising the pulse will be falling. On the third or the fourth day of the disease, for instance, with an evening exacerbation of half a degree or one degree of temperature, we may find that the pulse is, perhaps, ten beats slower than in the morning. The same discrepancy may appear, however, in cases of true dengue, and in the tropics also, in connection with other febrile

diseases. Still, this is exceptional. In dengue the excessive fall of the pulse presents itself with a distinct defervescence of the temperature, and it is probable that many cases that are reported from Cuba of slow pulse in typhoid and malarial fevers may have been cases of yellow fever.

MICROSCOPICAL EXAMINATION.—Poorly-prepared abstracts from the work of Sanarelli have led many to believe that a characteristic feature—the bacillus of Sanarelli itself—was found on examination of the blood. Even with the assistance of post-mortem examinations, Sanarelli was able to discover his bacillus in 56 per cent. only of the cases of yellow fever. He would be a poor clinician, indeed, who could only diagnose about one-half of the cases. Indeed, during life the microscope cannot establish a positive diagnosis. As far as our present methods go, it would be impossible to distinguish between a drop of yellow-fever blood and blood from a healthy man.

Negative evidence may be presented by the microscope. The presence of the *Plasmodium malariae*, for instance, would prove that a case was suffering with malarial poisoning, and presumably not with yellow fever. But the differential diagnosis between these two diseases is usually easy. The bilious remittent fever, that in our old text-books of medicine occupied a conspicuous place in tables of differential diagnosis with yellow fever, has practically disappeared from the Southern sea-border since yellow fever ceased to be an endemic there. It was, in fact, the yellow fever of the natives and of places in the interior. The former were supposed to possess some immunity against yellow fever, and the disease was believed to be restricted almost to the littoral.

The plasmodium has been found in the blood in cases of yellow fever. The mistake made by the board of experts of New Orleans, when they failed to recognize the existence of yellow fever at Ocean Springs, was due to the finding of the plasmodium in at least two of the cases.

DENGUE.—The prevalence of a widespread, mild, epidemic of fever during a recent outbreak of yellow fever has been undoubtedly a source of doubts and difficulties in connection with the diagnosis.

Many of these cases were found to exist in houses where cases of yellow fever were present at the time, and it was impossible to discover in them any of the characteristic symptoms of yellow fever. Many of these cases had a distinct eruption and must be looked upon as cases of dengue. This fact may bring forward new problems as to the relations between these two diseases. From our present point of view, we can only state that yellow fever appears to spread more easily when there is an epidemic of dengue prevailing. All evidence goes to show that a previous attack of dengue does not protect against yellow fever, and we must look upon the former as an entirely distinct disease.

Literature of '97-'98-'99.

Differentially considered, dengue has a demonstrable rash in the fauces always; between the shoulder-blades, generally; and often over the great joints and on the trunk. The pains of dengue are in the bones and joints. A dengue patient suffers and cannot lie still—he does not want to get up. In yellow fever the pains, except the head, are in the muscles, and the patient after four or five days is comfortable in bed, but wants to get up and work.

Malaria is usually prodromed for some days by malaise, loss of appetite, dis-

content, and a general feeling of fatigue. It nearly always attacks in the day-time or when the victim is at his work, and is ushered in with a positive chill. Constipation is the rule, but not so marked a feature as in yellow fever. The malarial tongue is swelled, tooth-marked, and heavy-coated, with white edge and yellow or dirty top-area. A yellow-fever tongue is rarely indented; the tongue of the former soon shrinks and has a red edge and red tip; the red tip being diamond shaped. Herpes does not occur in yellow-fever cases; it is common in malaria. This is, however, a late sign. R. D. Murray ("Yellow Fever: its Nature, Diagnosis, Treatment, and Prophylaxis," etc., by Officers of the U. S. Marine-Hosp. Service, '98).

Etiology and Pathology.—The natural habitat of yellow fever may be said to be the western coast of Africa, the West Indies, Central and South America so far south as the fortieth degree of latitude. It does not prevail in Japan, China, or India, or anywhere in Europe, nor does it naturally prevail anywhere on the mainland of the Northern Continent of the Western Hemisphere. Yet it may be carried almost anywhere, and imported epidemics have occurred at ports of England and Spain, and nearly all the northern ports of the Atlantic sea-board of the United States, including New York, Boston, and Portsmouth, N. H. Formerly it frequently attacked the northern ports of the United States on the Atlantic, but, as I believe, by reason of improved sewerage, paving, water-supply, and general sanitary conditions, it has ceased to be a specially dangerous menace north of the southern boundary of Maryland. Although it may prevail inland, it is pre-eminently a disease of filthy sea-ports, and is carried from one port to another by ships.

By some its importation into the West Indies is asserted to have been caused

by, as it certainly was intimately associated with, the negro slave-trade from Africa; but other historians believe it was found here by Columbus when he discovered America. The French writer Béranger Féraud insists on its American origin, and declares there was an epidemic of it in Haïti as early as 1493, after the battle of Mesa Real between the Spaniards and Indians.

The principal yellow-fever ports are Havana and other Cuban and West-Indian ports; Rio de Janeiro, Santos, Bahia, and Pernambuco, in Brazil; Vera Cruz, Maracaibo, Colon, and Panama. These ports are worse at some periods than at others, but it constantly prevails in one or more of them, and when one port becomes free from the disease it is subject to infection again from one of the other ports. There was no known yellow fever in Rio Janeiro until 1848, when it was introduced by an American ship from New Orleans, which, however, stopped *en route* at Pernambuco, Brazil.

These facts will illustrate the necessity for an international agreement for the elimination of yellow fever, which will be referred to hereafter.

Of all these ports Havana has been the most dangerous to the United States, both because of its propinquity and because, under the criminal negligence of the Spanish rule, all sanitation was disregarded, and filth was allowed to accumulate.

Yellow fever then, is a disease of the Western Hemisphere. For a long time, principally in New Orleans, where it formerly prevailed so frequently, it was a matter of animated discussion whether it was not there indigenous, but the establishment of the Holt system of scientific quarantine and the experience of the United States army in New Orleans under General Butler have proved al-

most beyond question that it is not indigenous. Yet, while it is not a natural inhabitant of the United States, there have been few years in the history of our country when it has not been brought to our shores. Once introduced and neglected, it will spread, particularly along the sea-coast of our southern territory, and the records show that within the present century there have been but nine years in which yellow fever has not visited the United States. In other words, in each of 91 years in the nineteenth century our shores have been visited. Some terrible epidemics have occurred in these years, notably in 1878 throughout the whole South, when the estimated deaths were 16,000; New York, 1803, 700 deaths; Boston, in 1802; Philadelphia, 1798, 3500 deaths, and 1805, 300 deaths; Nantucket, 1763; Charleston, 1858, 717 deaths; Norfolk, 1853, 1600 deaths, and 1855, 1807 deaths; Savannah, 1876; New Orleans, 1853, 7970 deaths, 1867, 3093 deaths; Galveston, 1867, 1150 deaths.

As to the nature of yellow fever and without reference to its ultimate bacteriological cause, it may be said that it is a disease of the tropics, requiring heat and moisture for its development, especially when associated with filth. When epidemic, it frequently spreads quite as rapidly in the clean portions of a city where there is no filth, yet it may properly be called a filth disease, for its ordinary culture-grounds are in places where filth accumulates and where no attention is paid to ordinary sanitary measures. Persons contract the fever from infected foci or places; that is to say, one might make a short visit to a yellow-fever patient and run little risk of contracting the disease, but should he sleep in a room previously

occupied for four or five days by a yellow-fever patient, he would be likely to contract the disease. The infection fastens itself particularly in the holds of wooden vessels and is carried by fomites: *i.e.*, the clothing and bedding which have been used by yellow-fever patients. Thus, in the summer-time a bundle of clothing taken from a yellow-fever patient in Havana shipped into Florida or one of the gulf-coast cities and there opened would be likely to cause an outbreak of the disease.

Since 1878, which was the year of the last great epidemic of yellow fever in the United States, although it has been repeatedly caught in the coast quarantine sieve, there have been but five years when it has prevailed to any considerable extent anywhere in the United States. It prevailed in Florida, particularly in Jacksonville, in 1888. In 1893 it was admitted, before the present Quarantine Regulations made under the law which was passed by Congress in 1893 had been put into effect, into Brunswick, Georgia; but, owing to the efforts of the Marine-Hospital Service, it was confined to that city and one or two neighboring localities, and there was no interruption of traffic. The number of cases was 1076 and the number of deaths 46. In 1897 the disease was introduced into Ocean Springs, Mississippi, as early as April by a traveler, who came from San Jose on the Pacific Coast of Guatemala, took passage from Port Barrios on the Atlantic Coast of Guatemala, came through New Orleans on April 12th, and arrived in Ocean Springs on April 13th, sick. The disease was not recognized until September 4th, when it was declared to be yellow fever. From this summer resort the people had been coming and going through all the intervening months, and

on the announcement of yellow fever they scattered in all directions. It was on this account the disease was so widespread, involving a number of places in Louisiana, Mississippi, Alabama, a few cases being also discovered in Texas. There was, in all, a total of 4429 cases and 484 deaths reported.

The fever in the summer and fall of 1898 undoubtedly was a recrudescence from the previous year. The winter had been an exceptionally mild one—so mild as to permit the germs to lie dormant. There were reported, in 1898, 2456 cases and 115 deaths. In the summer and fall of 1899 the disease again appeared in Louisiana and Mississippi, and, notwithstanding the previous severe winter, it is thought to have been a recrudescence.

In each of these years—1893, 1897, 1898, and 1899—the type of the disease was surprisingly mild; so mild, in fact, that at the beginning of each outbreak, excepting that of 1899 in New Orleans, the disease was not recognized, being confounded with malaria and dengue.

In 1898, during the Spanish war, there were cases of suspicious fever occurring in Key West, Fla., but a searching inquiry led to the opinion by experts that the disease was dengue, and, while the spread of the malady was considerable, there were no fatalities.

In 1899 yellow fever made an actual appearance in Key West. Its origin is wrapped in some mystery; by some it was thought to have been a recrudescence from the 1898 cases alluded to above, but this was never proved and involves the admission that the cases in 1898 were yellow fever and were not recognized as such. If the disease was imported the method and channel of its importation has never been satisfactorily demonstrated. It is, however, well known that many years had elapsed

since the prevalence of yellow fever in epidemic form in the city, and during these years the children born and strangers present in the city in large numbers formed a larger non-immune population than had resided there in many decades previously. From Key West the fever spread to Miami, and 10 cases appeared also in Port Tampa, there being in Florida a total of 1536 cases and 84 deaths reported. A probable recrudescence of the disease in New Orleans, La., in the same year gave 115 reported cases and 20 deaths, and various small outbreaks in Mississippi gave 90 cases and 11 deaths.

The mortality from yellow fever within the United States during the past 102 years,—1798-1899, inclusive,—obtained from the incomplete statistics which have been recorded, is 80,935. This shows that the average annual mortality from this disease is 793. There have been several severe epidemics of yellow fever in the United States, and the disease has prevailed extensively in smaller towns and in the country at different times, in which the mortality from the disease has not been recorded. Hence, the average annual mortality from this disease is much greater than the above figures show.

Literature of '97-'98-'99.

Influence of rain-fall on yellow fever:

(1) a dry state of soil furnishes conditions that are favorable as antecedents of yellow fever; (2) when this dryness is terminated by rain, the explosion occurs and continues with a moderate amount of moisture; (3) soil-wetness in well-pronounced fevers causes the decline of fever; (4) habitual wetness or moisture of the soil is unfavorable to yellow fever. C. H. Eyles (Edinburgh Med. Jour., Dec., '98).

All places within a yellow-fever-infected district, or town even, are not in-

fectured or are infected in unequal degrees. The infection is especially confined to the habitations of men and their environment, and is conveyed a short distance, possibly two hundred and twenty metres down the wind, from an infected focus. Two hundred and twenty metres is the maximum distance this infection can be conveyed. The infection is heavy and hangs and spreads near the ground. It is unable to pass a close wall of any considerable height, although under the shady side of such a wall it may spread well when once started. It seems especially active at night, and certainly, out-of-doors, is less apt to be contracted on clear, dry days.

The rate of propagation of out-door infection is increased in cities in dusty weather. Strong, steady winds in clear weather lessen the infection. There is no reason to believe that yellow fever as usually propagated in this country is water-borne—the fresh-water tanks of infected vessels have never been and are not now emptied at our maritime quarantines. H. R. Carter ("Yellow Fever: its Nature, Diagnosis, Treatment, and Prophylaxis," etc., by Officers of the U. S. Marine-Hosp. Service, '98).

As to the pathogenic element of yellow fever, the prevailing view is that it is the bacillus icteroides of Sanarelli. This conclusion is based upon a careful bacteriological study in the well-equipped laboratory of the Marine-Hospital Service in Havana, Cuba. The report of the Medical Officers of the Service (Drs. Eugene Wasdin and H. D. Geddings) appointed as a commission to study the nature of yellow fever and dated July 10, 1899, submits the following conclusions:—

First. That the micro-organism discovered by Prof. Giuseppe Sanarelli, of the University of Bologna, Italy, and by him named "bacillus icteroides," is the cause of yellow fever.

Second. That yellow fever is naturally infectious to certain animals, the

degree varying with the species; that in some rodents local infection is very quickly followed by blood-infection; and that, while in dogs and rabbits there is no evidence of this subsequent invasion of the blood, monkeys react to the infection the same as man.

Third. That infection takes place by way of the respiratory tract, the primary colonization in this tract giving rise to the earlier manifestations of the disease.

Fourth. That in many cases of the disease, probably a majority, the primary infection or colonization in the lungs is followed by a "secondary infection" or a secondary colonization of this organism in the blood of the patient. This secondary infection may be complicated by the coinstantaneous passage of other organisms into the blood, or this complication may arise during the last hours of life.

Fifth. That there is no evidence to support the theory advanced by Professor Sanarelli that this disease is primarily a septicæmia, inasmuch as cases do occur in which the bacillus *icteroides* cannot be found in the blood or organs in which it might be deposited therefrom.

Sixth. That there exists no causal relationship between the bacillus "X," of Sternberg and this highly-infectious disease, and that the bacillus "X" is frequently found in the intestinal content of normal animals and of man, as well as in the urine and the bronchial secretion.

Seventh. That, so far as the commission is aware, the bacillus *icteroides* has never been found in any body other than one infected with yellow fever, and that, whatever may be the cultural similarities between this and other micro-organisms, it is characterized by a specificity which is distinctive.

Eighth. That the bacillus *icteroides* is very susceptible to the influences injurious to bacterial life; and that its ready control by the processes of disinfection, chemical and mechanical, is assured.

Ninth. That the bacillus *icteroides* produces *in vitro*, as well as *in vita*, a toxin of the most marked potency; and that, from our present knowledge, there exists a reasonable possibility of the ultimate production of an antiserum more potent than that of Professor Sanarelli.

Literature of '97-'98-'99.

There does not exist any lesion truly pathognomonic of yellow fever. The cadavers of the victims of yellow fever are either sterile or they are found to be invaded throughout by a mixture of microbes. The specific microbe, to which the name of "bacillus *icteroides*" has been given, has never been found alone in the autopsies made. It must be sought for in the blood and in the tissues, and not in the gastro-intestinal tube, in which it has never been encountered. Upon the result of investigations it may be said the isolation of the specific microbe of yellow fever is possible in only 58 per cent. of the cases. This bacillus is a little rod, with rounded extremities, united at best by pairs in cultures and in groups in the tissues, from two to four micromillimetres in length, and generally two or three times longer than it is broad. The microbe of yellow fever is pathogenic for the greater number of the domestic animals. The diffusion of the virus of yellow fever can take place as well by air as by water. Sanarelli (Med. Rec., July 24, '97).

It is evident from observations that the micro-organism described by Sanarelli is identical with the bacillus X which has been personally described. Cultures containing the bacillus X produce vomiting, fatty degeneration, and hæmorrhagic enteritis, proving that its action is identical with that of Sanarelli.

Sternberg (Med. and Surg. Reporter, Nov. 6, '97).

Characteristic features of the autopsy-findings in cases of yellow fever are rigidity of the body, yellowness of the skin, extensive hypostatic congestion, dilated pupils, and bloody gums. Internally there is yellowness and dryness of the peritoneum, congestion of the omentum, congestion and swelling of the kidneys, and extravasation in the mucous membranes. The liver and spleen are usually normal in size. The former may vary in color from buff to dark brown, and may present a nutmeg appearance. There is usually extensive fatty degeneration. There are ecchymoses in the pericardium, but the thorax is not otherwise characteristic. E. Wasdin (Med. News, Sept. 3, '98).

The findings of yellow fever post-mortem are as follow: The skin and sclerotics markedly icteric; usually early ecchymotic spots on the back of the neck, shoulders, and lumbar regions, thighs, calves of legs, and the ears. The abdomen is usually dry, sometimes a little fluid is present; the liver is contracted away from the ribs, of a box-wood color, bloodless, and friable. The gall-bladder is contracted, usually empty, but sometimes containing a thick, tarry, fluid. The spleen is normal in size and color. The kidneys are normal, sometimes showing signs of recent acute inflammation. The stomach is usually anæmic, generally shows exfoliated spots where hæmorrhages have occurred, and frequently contains black vomit. The intestines generally contain a pasty-colored material like the stools, only not so black. The mucous membrane of the whole alimentary tract shows the most decided effects of the poison. The heart often shows traces of fatty degeneration. Report of Cuban Commission of Mississippi (Jour. Mississippi State Med. Assoc., May, '98).

The following conclusions are based upon the study of 348 specimens of urine, 154 of blood, and 51 autopsies: 1. Albuminuria and presence of bile in the urine is a constant symptom in yellow fever, appearing about the fourth day in mild and earlier in severe cases.

2. The presence of the malarial hæmatozoön does not preclude the possibility of yellow fever. 3. In solutions one to ten the yellow-fever blood does not give any reaction with pure cultures of the typhus bacillus. 4. If we except the diminution of hæmoglobin, the blood does not show any marked changes. 5. The most characteristic pathological changes in the organs are the marked steatosis and congestion of liver, kidney, and heart; the marked congestions, erosions, and hæmorrhages of the stomach and intestines; and, usually, absence of lesions in the spleen and lungs. The other tissues present a marked icterus and congestion. 6. The bacillus which we isolated and with which we have experimented is identical with that reported by Sanarelli as the bacillus icteroides, and the results obtained would justify us in considering it the special cause of yellow fever. O. L. Pothier (Jour. Amer. Med. Assoc., Apr. 16, '98).

Treatment. — The therapeutic measures indicated in yellow fever herein described are recommended by Past Assistant Surgeon H. D. Geddings, of the Marine-Hospital Service.

For the relief of the chill and subsequent fever, the distressing headache and pain in the back, loins, and limbs, it is believed that the old plan of administering a hot foot-bath containing mustard is an eminently proper one. The bath hastens reaction from the chill, markedly relieves the headache and pains in the back and legs, and promotes diaphoresis. The patient, being then restored to bed, should be covered warmly, but not too heavily, and gradually uncovered as diaphoresis proceeds, in order to avoid undue prostration. Care should be exercised to prevent sudden chilling of the surface.

As soon as the patient is made comfortable in bed the remedial treatment should be begun. At this stage this should consist of a sharp purge, prefer-

ably mercurial. I have found calomel, 5 grains; compound powder of jalap, 10 grains; administered in capsules, most efficient. Others prefer the compound cathartic pills (U. S. P.), of which 1, 2, or 3 may be administered, according to the age and general condition of the patient. Should either of these remedies fail to move the bowels freely within six or eight hours, it may be followed by a moderate dose of castor-oil, a Sedlitz powder, or a bottle of citrate of magnesia.

Closely following the first purgative should be administered one of the coal-tar febrifuges: phenacetin, $7\frac{1}{2}$ grains; or antipyrin or antifebrin, 10 grains; either of which may with advantage be combined with $1\frac{1}{2}$ to $2\frac{1}{2}$ grains of citrate of caffeine. By the use, in moderate doses, of the coal-tar products at the inception of the attack, we relieve headache and the racking pain in back and limbs, diminish restlessness, and reduce temperature considerably. The action of the first dose of the antipyretic appears to furnish, in some sort, an index of the course of the particular case under observation. If after the administration of the antipyretic the patient passes into an easy sleep and wakes with diminished headache and other pains, a moist skin, and a reduced temperature, there is reason to believe that the case may be mild or of moderate severity, and will end in recovery. If, on the contrary, the antipyretic produces but slight influence on the temperature, where restlessness is not diminished or controlled, where pain persists, and the skin, though moist, has a burning, pungent feeling, the worst and trouble to the very end are to be feared. Repeated doses of the antipyretic are not needed, or indeed indicated. One, two, or, at most, three doses in the first

twenty-four hours of the disease will accomplish all that is to be gained from this series of remedies. Administered later in the disease, they exercise too depressing an effect on a heart already weakened as a consequence of more or less profound toxæmia.

The gastric irritability, which is often extreme at the onset of an attack of yellow fever, may be controlled by sips to the epigastrium, abstention from fluids, and frequent ingestion of small pieces of ice, which not only allay thirst, but also tend in themselves to relieve nausea. Should the latter or vomiting persist, the administration of cocaine hydrochlorate, in doses of $\frac{1}{4}$ grain to $\frac{1}{2}$ grain every hour or two, will often act almost magically. Small quantities of carbonated beverages, as Vichy, Seltzer, or Apollinaris water, ginger-ale, or very dry champagne, administered ice cold, will often prove of service. Creasote has also been highly recommended, and also a mixture containing hydrocyanic acid and morphine. Considerable relief is also derived from the application to the epigastrium of a liniment composed of olive-oil and menthol.

On the afternoon of the second or morning of the third day the presence of albumin in the urine may be noted, unless the case be of the most ephemeral mildness. The quantity present on first detection, and its increase or diminution from day to day, form, perhaps, a fairly-good guide to prognosis. If it appears, increases gradually, and then begins to diminish, prognosis is good. If, on the contrary, it appears at first in large amount, persists or increases abruptly, trouble may be anticipated.

How shall we best treat the condition resulting in black vomit? The problem being both to arrest vomiting

and to treat the condition giving rise to it, it follows that treatment should be directed toward the general hæmorrhagic diathesis. Probably the most efficient remedy is found in the tincture of the perchloride of iron. That should be given in large doses, 15 to 30 drops every hour or two, or, if vomiting is frequent, after each act of emesis. Counter-irritation to the epigastrium, the administration of stimulants, preferably champagne or good brandy administered in carbonated water and given cold, swallowing of ice, and administration of cocaine, make up about the sum of our remedial agents. While enough has been said to show that black vomit is a most serious symptom, it does not follow that every patient who vomits black matter will necessarily die. A fair proportion of cases recover after the symptom has manifested itself. Still, the ejection of black vomit makes a most profound mental impression on a patient, and for this reason has often hastened a fatal termination in a case which, up to the appearance of this accident, had done well.

Of far graver importance is the train of symptoms which leads to uræmia, and which are announced by partial or complete suppression of urine. This is probably the gravest accident that can happen in the course of yellow fever. The amount and character of the urinary secretion should be a matter of frequent inquiry in every case, grave or mild, from the inception to convalescence. A sudden and irregular increase in the amount of albumin should put us on our guard against possible urinary suppression, and prompt treatment should be instituted and maintained. Counter-irritation over the region of the kidneys with turpentine or mustard, dry cups, the application of hot-water bags,

all should be tried. A *tisane* of water-melon seeds has long enjoyed the reputation of being almost a specific among the creole population of New Orleans, and I can bear personal testimony to its efficacy alone or given in combination with spirit of nitrous ether. Of almost equal reputation is a *tisane* of orange-leaves, preferably of the bitter variety, given in large quantities and frequently. In cases of suppression or very decided diminution of the urinary secretion, high enemata of cold water will often produce an abundant secretion and evacuation of urine. The practice being free from all danger, the expedient is certainly well worth a trial.

A remedy much used in Brunswick in 1893, and vaunted as almost specific by those very successful in the management of the disease, was spirit of turpentine, which was sometimes given in heroic quantity, as much as a teaspoonful at a dose and repeated. The results claimed for it warrant its more extended use. A failing heart should receive appropriate stimulation. Alcoholics should be freely used; ammonia in the form of the aromatic spirit should be exhibited for its well-known diffusible stimulating effects, but its irritating effects upon the stomach should also be borne in mind, and hypodermic injections of strychnine, pushed to the extreme limit of tolerance, should be used in cases where a fatal issue through the circulatory apparatus seems to threaten. It has often seemed desirable to make use of inhalations of oxygen in cases where failure of heart and respiration seems to threaten as a result of uræmic poisoning.

An important feature in the treatment of yellow fever is the frequent washing out of the lower bowel with enemata of warm water and soap. Con-

stipation is the rule, and no one who has noted the exceedingly foetid, almost putrid, character of the stools of a yellow-fever convalescent can fail to see the wisdom of removing the chances of septic absorption by frequent washing away of this fermenting mass. A well-oiled rectal tube should be passed as far up into the bowel as possible, and with a fountain-syringe elevated not more than a foot or two, 2 or 3 pints of warm, soapy water should be injected into the bowel. The whole operation should be performed with the patient upon a bed-pan, not seated upon a vessel or close stool. The effect upon the temperature and general condition of the patient is most marked.

Quinine or allied preparations are generally accepted to possess no specific effect. But as yellow fever almost always occurs in regions where malarial diseases are also rife, and as the inter-currence of a malarial paroxysm is one of the most disagreeable incidents that can mar the course of a case, it is good practice in such regions to administer 30 to 45 grains of quinine or cinchonidia in the first twenty-four hours, exhibiting the drug per rectum if the stomach is irritable.

DIETETIC MANAGEMENT.—A most important point in the management of yellow fever is the diet. Many a patient, his crisis past and the borders of convalescence reached, has been hurried into an untimely grave by the misplaced kindness of an apparently simple meal. The yellow-fever patient should never be starved; on the contrary, he should be well nourished, but the most scrupulous care should be exercised in the selection and administration of his diet. "A little and that often" should be the rule. For the first few days milk with lime-water, given cold; then animal

broths, concentrated, but free of fat, should be the regimen. The fever being reduced, soft-boiled eggs, milk-toast, and small bits of the white meat of chicken and tenderest steak may be permitted. Probably at least ten days or two weeks should elapse before the convalescent, by the easiest stages, should be permitted to resume ordinary diet.

Literature of '97-'98-'99.

A case of yellow fever can be treated in a room in a crowded hotel, and by taking the following sanitary precautions no other guest in the place need become infected: Over the windows should be placed a double thickness of mosquito netting or some such material, kept constantly moist with a 1 to 500 bichloride solution. The patient's gown and bed-clothing should be removed twice daily, immediately putting the same in a 1 to 500 bichloride solution, and a rubber sheet placed next to the mattress. The fewest possible things should be allowed in the room, and these are to be wiped with bichloride solution once daily. All dejecta, sputa, etc., from the patient are to be placed in the same solution, and all cups, towels, glasses, etc., are to be treated in like manner. The nurse should stay in the sick-room, or else when going out she should take a bichloride bath, if possible, and put on sterilized clothing all over,—her shoes included,—unless she is simply leaving for a few minutes, in which case she should take the same precautions as the physician.

The physician should always put on a cotton gown wet with the same solution before going in the sick-room; this is to be removed when he comes out, and his hands and face should receive a formaldehyde or bichloride bath at once.

On recovery or death of the patient, if the room and its contents are thoroughly disinfected, it will positively prevent a spread of the fever. H. M. Folkes (*Georgia Jour. Med. and Surg.*, July, '98).

Management of Epidemics (From an

address by the Surgeon-General of the Marine-Hospital Service). — Before going into details let me explain that there are parts even of the southern portion of the United States which are known to practical sanitarians as non-infectible territory. These are, generally speaking, high and mountainous sections of the South where experience has shown that yellow fever will not naturally spread if introduced. It does not follow that yellow fever cannot spread there, but, with ordinary precautions, the danger is at a minimum. Thus, St. Louis is in the non-infectible territory, but, with carelessness and a sufficient number of infected refugees arriving without disinfection, the disease could become epidemic in St. Louis. In 1878, when refugees came from the South to this city, the precautions taken were excellent. Patients were ferreted out by the Board of Health and were taken to hospitals outside the city. In this way an epidemic was prevented. Of course, there was disinfection of patients' bedding, clothing, etc. In less-favored localities, however, it would have been necessary to place and keep under observation every person who had been in contact with the room of the patient. As further examples, Atlanta, Georgia; and Huntsville, Alabama, may be mentioned as localities where, on account of the elevation, character of the soil, drainage, etc., the disease, though from time to time introduced, has never spread.

The work principally involved in suppressing the disease is in isolation and disinfection. If the first case is discovered it is within our power to limit it to the house in which it prevails, the first effort being to prevent the room and the house itself from becoming infected. This may be done by a fre-

quent change of the bedding and personal wear of the patient and the prompt immersion of all such in boiling water or disinfecting solutions. If the disease has prevailed for some time, and persons have had free ingress and egress, it becomes necessary to take those persons and hold them under observation a period of ten days to see whether they will develop yellow fever. One can readily imagine, in a district where it has been allowed to run along for some weeks, how difficult it is to trace all the people who have been exposed to infection. Difficult as it is, this is attempted and frequently with successful results. An examination is at once begun of surrounding houses and neighboring villages, particularly along the line of a railroad, to see whether the disease may be anywhere co-existent. If the disease prevails in a considerable number of houses, there is no doubt that an excellent plan is to remove the sick to a hospital, though great care must be exercised in moving them, and taking the well to a detention camp, and then disinfecting the vacated premises.

While panic and alarm are to be avoided, there is no doubt that it is safer for those who have not been exposed and in the interests of the suppression of the spread of the epidemic, inasmuch as it removes the material on which it may feed, if people will leave. At this time the railroads are taken charge of by the sanitary authorities, and the leaving must be under sanitary regulations. Those who have not been exposed to infection, when this is absolutely proved, may depart. Those concerning whom there is some doubt may go on through trains to the non-infectible territory, where they must report and be kept under observation for a

period of ten days. Those who are known to have been exposed must be taken to a detention camp, there to be held ten days until they have demonstrated their freedom from infection, when they may be allowed to depart. If a city or village is infected, and its dimensions will allow of a cordon being placed around it, this is done, and no one is allowed to leave except under these conditions. This was done at Brunswick, Georgia, there being guards on land and revenue cutters on the water-front to prevent egress except through the detention camp, twenty-five miles off, where every provision was made for the comfort of the people undergoing detention. When the city is too large to be thus surrounded the outgoing trains are under sanitary surveillance, and no tickets are allowed to be sold except to persons who have certificates that they have been under observation for ten days, and are free from the disease, or unless the ticket is one which leads clear through to non-infectible territory, and the baggage of all these passengers must be disinfected before leaving. Now Atlanta, as I have said, is in the non-infectible territory, and if yellow fever prevails in New Orleans people who are believed, though not positively known, to be free from infection, are given tickets to Atlanta, and their baggage disinfected. Now, what is to prevent those people at Atlanta immediately taking the south-bound train and returning into the infectible territory where, if the disease should appear, it would be likely to spread? This is managed through the railroad officials, who require a certificate from the Marine-Hospital officer stationed at Atlanta of every person wishing to buy a ticket for a point south—say, Florida—that he has been in

Atlanta ten days, and is entirely well, and that the baggage he brought with him from New Orleans has been disinfected. Furthermore, on the trains leaving the infected city there are train-inspectors appointed with a view to recognizing quickly any chance cases of the disease and to prevent any persons boarding the train who might leave the city, and try to board it at some outside point, and to see that the passengers go through to the non-infectible localities. This train-inspection service, I have found, is very efficient in checking the spread of the disease. Its details can hardly be gone into here, and it is sufficient to say that the inspectors have certain runs and relays, so that those going from an infected territory return into the infected territory, delivering their passengers to those who come from the non-infected territory, who carry them through to the non-infectible territory. At the same time a classification of freight is made, and such as may carry infection is disinfected before being allowed to leave the infected city.

Before closing this part of the subject I wish to dwell upon the importance of recognizing the first case. It need not be announced with a flourish of trumpets to alarm the people, but it should be announced to the proper authorities as soon as it is found. The cause of so much panic being produced by yellow fever is the fact that it is so frequently concealed until concealment is no longer possible, by which time there is cause for panic. But if promptly reported there should be no more cause for fear than is caused by a case of small-pox or cholera.

The disease of late years has been so mild that there has been much doubt as to the nature of the first cases, but these can be determined upon and taken

care of. I might say there has been too much written and said about yellow fever. The subject should be made less of by the daily press. The public authorities should be promptly advised of the appearance of the disease and take prompt charge, and when this is done there need be no more fear or panic than is caused by other diseases.

Literature of '97-'98-'99.

As to personal protection against the disease, observance of the rules for personal cleanliness is imperative. All undue fatigue should be avoided, and the question of suitable clothing carefully considered. The greatest regularity in taking meals should be observed and the use of boiled water is advisable. Alcoholic beverages to one unused to them are harmful; to those habituated their use in moderation seems necessary. The use of internal medication to ward off this disease is useless. The hygiene of environment is the more important. One should select a dry, well-drained abode, to which sunlight has free access, and which can be thoroughly ventilated. One should live such a way that the precautions suggested above may be intelligently exercised, and he will have done all that a sound mind within a sound body can do. Wasdin ("Yellow Fever: its Nature, Diagnosis, Treatment, and Prophylaxis," etc., by Officers of the U. S. Marine-Hosp. Service, '98).

Businessmen should leave the city every afternoon before sunset and spend the night at some of the small towns near by, returning next morning after sunrise to pursue their different callings. In a sea-port or in a town on a river persons should be prohibited from sleeping near the wharf or river-front.

Care should be taken to sterilize all clothing and material in infected room and to thoroughly disinfect the room and contents after recovery or death of the patient. One of the principal precautions to be taken is in the matter of clothing. Flannel, light in texture and color, is the best material. W. F. Brunner ("Yellow Fever: its Nature, Diag-

nosis, Treatment, and Prophylaxis," etc., by Officers of the U. S. Marine-Hosp. Service, '98).

The following methods of disinfection are advised:—

1. Apartments or dwellings infected with yellow fever to be disinfected by one or more of the following methods: (a) By a thorough washing of all surfaces of apartments with an efficient germicidal solution. (b) By sulphur dioxide for twenty-four hours' exposure: 4 pounds of sulphur for each 1000 cubic feet, plus due allowance made for waste. (c) By formaldehyde-gas in not less than a 4-per-cent. per-volume strength, and not less than six hours' exposure. [Note: One litre of 40-per-cent. solution of formaldehyde-gas will evolve about 1425 litres (50.1 cubic feet) of gas at 20° C. (68° F.).]

2. Grounds, out-buildings, etc., deemed to be infected, to be disinfected with a strong solution of crude carbolic acid (carbolic acid, crude, 2 parts; sulphuric acid, 1 part; water, 25 parts) or an acid solution of bichloride of mercury (1 to 500); disinfection of ground preferably by fire.

3. Bedding, wearing apparel, carpets, upholstered furniture, and the like to be disinfected by one or more of the following methods: (a) By steam at a temperature of 100° to 102° C., thirty minutes' exposure. (b) By boiling, all parts of the articles to be submerged. (c) By saturation in an efficient germicidal solution. (d) By thoroughly wetting the surfaces of articles with a 40-per-cent. aqueous solution of formaldehyde, and placing them in a closed space for not less than twelve hours. (e) Where surface disinfection is required, formaldehyde-gas of not less than a 4-per-cent. per-volume strength and not less than six hours' exposure, or by sulphur dioxide for not less than twenty-four hours.

4. The dejecta from cases of yellow fever to be disinfected by an efficient germicidal solution.

Mails to be disinfected by one of the following methods: (a) By formaldehyde. (b) By sulphur dioxide. (c) By steam. (Newspapers must be made up

in such packages as shall be penetrable to the disinfectant used.)

Articles injured by steam, such as rubber, leather, and containers, to which disinfection by steam is inapplicable, to be disinfected: (a) By thoroughly wetting all surfaces with an efficient germicidal solution, the articles being allowed to dry. (b) By exposure to sulphur dioxide. (c) By exposure to formaldehyde gas. The application of gaseous disinfection to these articles should be made in a closed space, air-tight, or as nearly so as possible.

The following are considered efficient germicides: 1. Bichloride of mercury acid, 1 to 1000. 2. Carbolic acid, pure, 5-per-cent. solution. 3. Trikresol, 2-per-cent. solution. 4. Solution of formaldehyde, 1 to 500 (which is 1 part of a 40-per cent. solution of formaldehyde to 199 parts of water). 5. Solutions of hypochlorite of calcium (chloride of lime). J. H. White ("Yellow Fever: its Nature, Diagnosis, Treatment, and Prophylaxis," etc., by Officers of the U. S. Marine-Hosp. Service, '98).

If the fever be confined to one section of the town, even if pretty general therein, it may be possible so to isolate that part as to preserve the remainder. The patient should, if possible, be moved to an isolated place or a well-appointed hospital. Removal during the first forty-eight or sixty hours prior to the "stage of calm" is not specially injurious. After that time it is to be deprecated.

If moved, all possible precautions to prevent infection of his new quarters must be taken. Cleanliness, dryness, good ventilation, and sunshine are all important. No fabrics, carpets, hangings, etc., not absolutely necessary, should be allowed in the room. The clothing, bedding, etc., which go with him if moved must be immediately disinfected. A rubber sheet to protect the mattress must be on the bed. The bed-linen and shirt must be changed daily, oftener if soiled; the rubber sheet changed when necessary. All fabrics used about the patient should go immediately—in the room—into an antiseptic solution. The floor is to be wiped up daily with a similar solution. All excreta should be disin-

fected or destroyed. The physician should wear linen or other smooth clothing, or change it if he goes out. These precautions are recommended only when there are very few patients, and every real risk, however slight, is to be avoided. Until premises are released from observation they must be under guard. The premises adjacent to those of the patient which, from propinquity, communication, or direction of wind, can reasonably be judged to have received infection are also to be disinfected.

The inmates of the house of the patient (unless immune to yellow fever) should be removed from the house, all clothing, etc., disinfected and kept under observation—"quarantined,"—in a place free from infection and so situated that if any of them sickens he may not establish a focus of infection dangerous to the community.

It is to be noted how rarely people taken from infected premises and placed in camps, or under the conditions of camp-life, develop fever.

When the fever cannot be suppressed, the providing of a legitimate means of egress, if safe, is an added safeguard, and an important one, against the infection of clean territory.

Stress should be laid on early depopulation. Classes who may leave are those who have been certainly not exposed to infection. The others may go (1) directly to points incapable of receiving the infection of yellow fever, generally Northern points,—high altitudes,—to remain there indefinitely, or for a time to cover their incubation; (2) to points capable of receiving such infection, but through a camp of detention. H. R. Carter ("Yellow Fever: its Nature, Diagnosis, Treatment, and Prophylaxis," etc., by Officers of the U. S. Marine-Hosp. Service, '98).

SERO-THERAPY IN THE SUPPRESSION OF EPIDEMICS.—In closing the subject of the epidemic management of yellow fever, it seems proper to make brief allusion to hopes of what the future may have in store for us in this direction.

A glance at the history of epidemic diseases will show that half of the terror inspired by these diseases has been from ignorance of their specific causes. The cause discovered, we know with what we have to deal, and what it is necessary to do. The discovery of the spirillum of Asiatic cholera, by Koch, the demonstration that it was by drinking-water that the disease was most frequently transmitted, experiments showing the slight resistance of the organism to physical agents and chemical disinfection, at once converted a dreaded pestilence into a comparatively simply handled problem. The discovery by Yersin and Kitasato of the plague bacillus threw a flood of light on the means of transmission of the disease and led to the discovery of means for its prevention in the Haffkine prophylactic and its prevention and cure by the Roux-Yersin prevention and curative serum.

The discovery of the bacillus icteroides by Sanarelli, and the verification of his claims by the Commission of Medical Officers of the Marine-Hospital Service, have opened up to us a most

hopeful vista, continuing, as it does, the broad question of serum-prophylaxis and serum-therapy of disease.

The magnificent discovery of diphtheria antitoxin by Roux and Behring, and the saving of 100,000 lives annually which it has led to in the United States alone, lead us to hope that in the near future we may be in possession of a similar agent or agents against yellow fever. Modern prophylactic measures have rendered possible the prompt suppression of plague epidemics, and experiments now in progress lead us to hope for the production of a curative and preventive serum against yellow fever, and the possible production of a vaccine which it will be justifiable to apply in any community where the disease makes its appearance. This is no Utopian dream; we have certain facts as to other diseases, certain strong analogies to other pestilences, and certain experiments which give every ground for encouragement.

WALTER WYMAN,

Surgeon-General of the Marine-Hospital Service, Washington.

Z

ZINC.—Zincum (U. S. P.) is metallic zinc in the form of thin sheets, in irregular granulated pieces, molded into thin pencils, or in a state of fine powder. Zinc is found as a carbonate, silicate, and sulphide, associated with lead ores in many districts of Great Britain, on the Continent, and in the United States. Zinc is a bluish-white metal, which slowly tarnishes in the air, forming oxide and carbonate of zinc. It has a lamellar, crystalline structure. Zinc unites with the acids and halogens to form salts, of which the acetate, bro-

mine, carbonate, chloride, iodide, oxide, phosphide, sulphate, and valerianate are official.

Acetate of zinc occurs in white, monoclinical plates, having a pearly lustre, and is soluble in 2.7 parts of cold and in 1.5 parts of boiling water and in 36 parts of cold and in 3 parts of boiling alcohol. It possesses a high diffusion power.

Bromide of zinc occurs as a white, hygroscopical, crystalline powder, having a sharp, metallic taste, and is soluble in water, alcohol, ether, and ammonia.

Carbonate of zinc (precipitated) oc-

curs as an impalpable, white powder, of variable composition. It is insoluble in water.

Chloride of zinc (butter of zinc) occurs as a white, deliquescent powder, and is soluble in 0.3 part of water, in alcohol, and in ether. It possesses a high diffusion power. The official solution of zinc chloride occurs as a colorless, astringent, sweetish, aqueous, liquid, having an acid reaction, containing 50 per cent. by weight of zinc chloride and being miscible in all proportions with water. Burnett's disinfecting fluid is a solution of zinc chloride. Canquoin's paste is made by mixing zinc chloride with flour and water. The strength varies, according to the purpose, from 1 part of the chloride in 6 parts (weakest) to 1 part in 3 (strongest). When used, 10 or 15 drops of water are added to the applications, being made when a large tumor is to be destroyed. The stronger paste may be cut into pointed strips or arrows and dried before using, as suggested by Maisonneuve.

Iodide of zinc occurs as a white, hygroscopical, crystalline powder, having a sharp, saline taste; and is soluble in water, alcohol, and in ether. It possesses a high diffusion power.

Oxide of zinc occurs as a white, amorphous powder, having the property of absorbing carbon dioxide from the air. It is soluble in dilute acids, ammonia, and in ammonium carbonate. It should be kept in air-tight vessels. The ointment of the oxide of zinc (zinc ointment) contains 20 per cent. of zinc oxide.

Phosphide of zinc occurs as dark-gray crystals or metallic lumps, having a faint odor, and is soluble in hydrochloric and sulphuric acids with the evolution of hydrogen phosphide.

Sulphate of zinc (white vitriol; zinc

vitriol) occurs in colorless, rhombic crystals, having an astringent, metallic taste; they effloresce in dry air. It is soluble in 0.6 part of cold and in 0.2 part of boiling water and in 3 parts of glycerin. Villate's solution for treating caries consists of: sulphates of copper and zinc, of each, 15 parts; solution of subacetate of lead, 30 parts; vinegar, 300 parts.

Valerianate of zinc occurs in white, glistening laminae, having a valerianic-acid odor and a sweetish taste, and decomposing on exposure. It is soluble in 40 parts of alcohol and in 100 parts of water.

Preparations and Doses. — **IRRITANT (SOLUBLE).** — *Zinci acetat* (U. S. P.), 2 to 6 grains.

Zinci chloridum (U. S. P.), 1 to 2 grains.

Liquor zinci chloridi (U. S. P.).

Zinci iodidum (U. S. P.), 1 to 2 grains.

Zinci phosphidum (U. S. P.), $\frac{1}{16}$ to $\frac{1}{2}$ grain.

Zinci sulphas (U. S. P.), 1 to 3 grains (emetic, 10 to 60 grains).

Zinci valerianas (U. S. P.), $\frac{1}{2}$ to 2 grains.

MILD (INSOLUBLE). — *Zinci oxidum* (U. S. P.), 1 to 5 grains.

Unguentum zinci oxidi (U. S. P.).

Zinci carbonas præcipitatas (U. S. P.), 1 to 2 grains (emetic, 20 grains).

Zincum, U. S. P. (metallic zinc).

Physiological Action. — The common action of the soluble salts of zinc is astringent and irritant. These properties are manifested in unequal degrees on account of their different degrees of solubility and their varying affinity for water, and, perhaps, for the tissues.

The chloride and iodide, on account of their high diffusion power and great affinity for water, are the most energetic

of the zinc salts. When placed upon the unbroken skin they are almost inert; when the cuticle is removed, they penetrate the tissues and destroy them for a considerable depth, producing at first a sensation of warmth, which increases to a burning pain, lasting seven or eight hours, by which time the tissues are destroyed, and a white eschar is formed which separates in from seven to twelve days (Ringer). The chloride is a corrosive poison.

The sulphate, having a lower diffusion power, exerts a more superficial action upon the tissues. In small doses it increases for a time the appetite and digestion, but later causes gastro-intestinal catarrh, nausea, and anorexia.

The soluble salts of zinc form insoluble compounds with albumin, condense the tissues, and contract the blood-vessels. They are stimulant and astringent, lessen the secretions, and promote healthy reparative action.

The carbonate and oxide are insoluble, or but slightly soluble, in the animal fluids. They possess no affinity for water, and, though their action upon the tissues is very weak, they are slightly astringent.

The carbonate in large doses produces some nausea and vomiting. The sulphate, in full doses, acts more speedily, is a safe emetic, producing little prostration or nausea, and, as it generally empties the stomach in one complete evacuation, is the best emetic in cases of poisoning (Ringer). No satisfactory explanation has yet been given of the emetic action of the zinc salts. The sulphate excites vomiting when injected into the blood, or when mixed with albumin. Sulphate of zinc in large doses is an irritant poison. The oxide, being insoluble, exerts but little action upon the stomach.

Zinc does not appear to remain in the body, nor to produce chronic poisoning like lead and mercury. The salts are eliminated less rapidly than some other metals, passing out of the system in small quantities by the urine. The chief part may be recovered from the fæces, being probably excreted by the intestinal mucous membrane and with the bile.

Poisoning by Zinc Salts.—The chloride is an irritant poison, causing heat and a source of constriction of the throat, a strong metallic taste, a burning pain in the stomach, nausea, vomiting, profound depression of the pulse, coldness of the surface, cold clammy sweats, cramps of the leg-muscles, etc. The mind remains unaffected. In a few instances nervous symptoms have followed, besides the cramps, and in one notable case there was loss of the senses of taste and smell (Bartholow).

Sulphate of zinc in large doses acts as an irritant poison, producing vomiting, colicky pains, diarrhoea, prostration, etc.: symptoms almost identical with those produced by the sulphate of copper.

Zinc-smelters, according to Schlockow, rarely live beyond forty-five, and die, some of bronchial or gastro-intestinal catarrh, others of a peculiar nervous affection which commences with burning superficial pains, exalted sensibility, and reflex activity in the legs, and afterward puts on still more clearly the features of myelitis. A. Sacher finds that the intravenous injection of very large doses of zinc salts produces paralysis of the voluntary muscles.

Treatment of Poisoning by Zinc Salts.—Alkalies and their carbonates are the chemical antidotes, producing precipitates. Eggs and milk are useful, forming albuminates of zinc. Further treat-

ment will be indicated by the symptoms as they arrive.

Therapeutics. — **GASTRO-INTESTINAL DISORDERS.**—Zinc oxide is an excellent remedy for gastralgia. Bartholow recommends its use for the following condition: Pain after taking food, nausea, intestinal pain, succeeded by prompt alvine discharges, the fæces being made up largely of undigested food. From 5 to 10 grains mixed with aromatic powder and combined with morphine, if need be, may be given before each meal. It is a very efficient remedy in the summer diarrhœa of children: $\frac{1}{2}$ to 1 grain may be combined with 5 to 10 grains of bismuth subnitrate and 2 to 5 grains of saccharated pepsin, to be given every four to six hours. It is also useful in the chronic diarrhœa of children and adults in doses of from 2 to 10 grains. The sulphate has produced beneficial results in that form of dyspepsia which gives rise to oxaluria, when given in doses of $\frac{1}{2}$ to 2 grains. In chronic diarrhœa and dysentery it may be combined, as suggested by Bartholow, with opium and ipecac, 1 grain of each in pill being given three or four times a day.

The sulphate is much employed as an emetic in cases of narcotic poisoning, where prompt and efficient action is desired: the dose (6 to 10 grains), well diluted with water, may be given every fifteen minutes until emesis occurs.

RESPIRATORY DISORDERS.—The night-sweats of phthisis are often amenable to a pill containing 3 grains of zinc oxide and $\frac{1}{2}$ grain of extract of belladonna, given at bed-time. The oxide has been recommended as a serviceable prophylactic against the recurrence of the attacks of spasmodic asthma and as

a remedy in pertussis combined with a small dose of belladonna extract.

NERVOUS DISORDERS.—In spasmodic and convulsive (clonic) disorders the preparations of zinc are sometimes serviceable. They have been largely used in epilepsy and chorea. Epileptiform vertigo and epileptiform angina pectoris, when they arise from some gastric disorders, are sometimes cured by the oxide of zinc. The valerianate is useful in nervous headaches, nervous cough, hysterical aphonia, ovarian neuralgia, etc.

CUTANEOUS DISORDERS.—In lupus, epitheliomata, and unhealthy ulcers the dried sulphate of zinc may be freely dusted over the parts to destroy, by caustic action, the unhealthy tissues. For the destruction of malignant growths the chloride in its various forms—as solution, Canquoin's paste, or Maisonneuve's "caustic arrows"—may be employed. The zinc salts are useful for their astringent action in weeping eczema, impetigo, herpes, intertrigo, seborrhœa, and erythema. The ointment of the oxide is soothing and astringent. The iodide is valued as an alterative in chronic cutaneous disorders and in late syphilitic eruptions.

CATARRHAL DISORDERS.—In catarrhal disorders weak solutions of the soluble zinc salts are useful after the acute symptoms have subsided. Subacute conjunctivitis is relieved by either the acetate or sulphate (1 to 2 grains to the ounce of water). The same solution is valuable as an injection in the subacute stage of gonorrhœa; beginning with the weaker solution, the strength should be gradually increased until the discharge ceases.

C. SUMNER WITHERSTONE.

Philadelphia.

GENERAL INDEX.

- Abbe's Bowstring Method. See Stomach, Surgery of; Gastrotomy.
- Abdomen, Contusion of. See Abdomen.
- Abdomen, Cramps in. See Toxic Foods; Phalline Poisoning.
- Abdomen, Enlarged, in Children. See Osseous System; Rickets.
- ABDOMEN, INJURIES OF (*General Subject*).
- Abdomen, Cold. See Abscess of Liver (Index)—Phantom Tumor (Index).
- Abdomen, Puncture of. See Peritoneum; Ascites.
- Abdomen, Retraction of. See Meningitis, Tubercular.
- Abdomen, Wounds of. See Abdomen.
- Abdominal Aneurism. See Aneurism.
- Abdominal Cavity, Hæmorrhage into. See Uterine Adnexa; Tumors of Ovaries.
- Abdominal Distension. See Obstruction, Intestinal—Stomach, Surgery of; Intestines; Thrombosis.
- Abdominal Drainage. See Uterine Adnexa; Tumors of Ovaries.
- Abdominal Enlargements. See Uterine Adnexa; Tumors of Ovaries.
- Abdominal Examination, Keith's Method. See Liver; Tumors.
- Abdominal Fistula. See Cholelithiasis.
- Abdominal Hæmorrhage. See Potassium; Purgatives.
- Abdominal Nephrectomy. See Urinary System, Diseases of (Surgical); Nephrectomy.
- Abdominal Pain. See Colic (Index)—Suprarenal Capsules; Tumors—Toxic Foods; Shell-fish Poisoning.
- Abdominal Plethora. See Sulphur; Cutaneous Disorders.
- Abdominal Supravaginal Hysterectomy. See Uterus; Myoma.
- Abdominal Total Hysterectomy. See Uterus; Myoma.
- Abdominal Tuberculosis. See Creasote; Pulmonary Diseases.
- Abdominal Tumors. See Liver, Diseases of—Pancreas; Cysts—Tumors, Abdominal (Index)—Urinary System, Diseases of (Surgical); Movable Kidney—Uterine Adnexa; Acquired Malformations of Ovaries.
- Abdominal Typhus. See Typhoid Fever.
- Abdominal Walls, Dermoid Tumor of. See Uterine Adnexa; Tumors of Ovaries.
- Abdominal Walls, Rheumatism of. See Peritoneum; Acute Peritonitis.
- Abdominal Wall, Tumors of. See Liver; Tumors.
- Abducens Paralysis. See Strabismus.
- Abel's Bacillus. See Nasal Cavities; Atrophic Rhinitis.
- Abortifacient. See Cantharides—Cimicifuga—Digitalis—Hydrastis—Oxytocic (Index).
- ABORTION (*General Subject*). See Ergot—Gentian—Gold—Influenza—Pregnancy, Disorders of—Toxic Foods; Grain Poisoning—Uterus; Myoma.
- Abrasions. See Benzoin—Glycerin.
- Abrastol. See Naphthalin.
- Abric Acid. See Jequirity.
- Abrin. See Jequirity.
- Abrus. See Jequirity.
- ABSCCESS (*General Subject*). See Abdomen, Injuries of the—Actinomycosis—Adenitis—Ainol—Aneurism—Appendicitis—Cotton-plant—Dermatitis Exfoliativa—Dermatitis Medicamentosa—Encephalocoele—Fractures; Compound—Glands—Hydrogen Dioxide—Iodine and Derivatives—Linum—Manganese—Naphthalin, Naphthol, and Allied Compounds—Pepsin—Potassium; Caustics—Quinine—Strontium; Constitutional Disorders—Surgical Diseases; Secondary Wound Fever—Typhoid Fever—Vascular System; Phlebitis—Vascular System; Phlegmasia Alba Dolens.
- Abscess, Alveolar. See Jaws.
- Abscess, Amœbic. See Liver; Abscess.
- Abscess, Appendicular. See Appendicitis.
- Abscess, Axillary. See Wounds and Injuries of Thorax; Secondary Complications.
- Abscess, Bartholinian. See Hernia, Perineal.
- Abscess, Brain. See Brain, Abscess of (Index).
- Abscess, Cerebral. See Brain Abscess (Index)—Cerebral Abscess (Index)—Encephalic Abscess (Index).
- Abscess, Cold. See Cold Abscess (Index).
- Abscess, Encephalic. See Encephalic Abscess (Index).
- Abscess, Frontal. See Sinuses, Frontal.
- Abscess, Hepatic. See Abscess of Liver (Index)—Liver, Abscesses of (Index)—Parasites; Echinococcus.
- Abscess, Intestinal. See Dysentery.
- Abscess, Intramural. See Empyema.
- Abscess, Mammary. See Mammary Gland.
- Abscess, Mediastinal. See Mediastinum.
- Abscess, Metastatic. See Vascular System; Arteritis—Wounds (Septic) and Gangrene; Pyæmia.
- Abscess, Oesophageal. See Oesophagus; Foreign Bodies.
- Abscess of Antrum of Highmore. See Phenic Acid; Chlorphenol.
- Abscess of Brain. See Brain, Abscess of (Index).
- Abscess of Buttock. See Hip-joint Disease.
- Abscess of Chest. See Pleurisy, Acute.
- Abscess of Eyelids. See Palpebræ, Diseases of.
- Abscess of Hip. See Scorbutus, Infantile.
- Abscess of Joints. See Joints, Surgical Diseases of—Wounds (Septic) and Gangrene; Pyæmia.
- Abscess of Kidneys. See Abscess, Renal (Index)—Wounds (Septic) and Gangrene; Pyæmia.
- Abscess of Knee. See Scorbutus, Infantile.
- Abscess of Liver. See Abscess, Hepatic (Index).
- Abscess of Lung. See Dysentery; Amœbic—Liver; Abscess—Pseudoleukæmia—Pulmonary Abscess (Index)—Wounds and Injuries of Thorax; Foreign Bodies in Chest—Wounds and Injuries of Thorax; Pneumotony—Wounds (Septic) and Gangrene; Pyæmia.
- Abscess of Mediastinum. See Mediastinum.
- Abscess of Nasal Septum. See Nasal Cavities; Septum.
- Abscess of Neck. See Middle Ear; Mastoiditis.
- Abscess of Parotid Gland. See Wounds (Septic) and Gangrene; Pyæmia.
- Abscess of Prostate. See Urinary System, Surgical Diseases of—Urinary System, Surgical Diseases of; Foreign Bodies in Prostate.
- Abscess of Scalp. See Wounds of Head; Abscess of Scalp—Wounds of Head; Diseases Involving Skull.
- Abscess of Spine. See Spine, Diseases of; Tuberculosis.
- Abscess of Spleen. See Spleen, Diseases of—Wounds (Septic) and Gangrene; Pyæmia.
- Abscess of Thyroid Gland. See Goitre.
- Abscess, Palmar. See Tendons; Tenosynovitis.
- Abscess, Paranephritic. See Liver; Abscess.
- Abscess, Parenchymatous. See Mammary Gland.
- Abscess, Pelvic. See Peritoneum; Tuberculous Peritonitis.
- Abscess, Perinephric. See Urinary System, Diseases of (Surgical); Nephrotomy.
- Abscess, Perinephritic. See Liver; Abscess—Urinary System, Diseases of; Pyelitis.
- Abscess, Perityphlitic. See Intestines; Typhilitis.
- Abscess, Pharyngeal. See Intubation.
- Abscess, Psosæ. See Hernia, Femoral.
- Abscess, Pulmonary. See Abscess of Lung (Index)—Pulmonary Abscess (Index).
- Abscess, Renal. See Abscess of Kidneys (Index)—Urinary System, Diseases of (Surgical); Nephrotomy—Urinary System, Diseases of (Surgical); Resection.
- Abscess, Retro-oesophageal. See Intubation.
- Abscess, Retropharyngeal. See Croup; Catarrhal—Hydrocephalus, Acute—Tonsils; Retropharyngeal Abscess.

- Abscess, Sphenoidal. See Sinuses; Sphenoidal.
 Abscess, Subdiaphragmatic. See Empyema—Liver; Hydratid Cyst—Spleen; Abscess.
 Abscess, Submammary. See Mammary Gland.
 Abscess, Subpectoral. See Wounds and Injuries of Thorax; Secondary Complications.
 Abscess, Subphrenic. See Liver; Acute Perihepatitis—Pleura; Pneumothorax—Pleurisy; Acute.
 Abscess, Subpleural. See Wounds and Injuries of Thorax; Secondary Complications.
 Abscess, Superficial. See Toxic Foods; Grain Poisoning.
 Abscess, Tropical. See Liver; Abscess.
 Abscess, Tuberculous. See Hip-joint Disease—Iodine; Iodoform—Pancreatin.
 Abscess, Tubo-ovarian. See Uterine Adnexa; Inflammations of Tubes.
 Abscess, Urethral. See Urinary System, Surgical Diseases of; Rupture of Urethra.
 Absence of Uterus. See Uterus; Malformations.
 Absence of Vagina. See Vagina; Absence and Defects of Structure.
 Absinthe. See Absinthum—Alcoholism.
 ABSINTHIUM (WORMWOOD) (*General Subject*).
 Acacia Dressing. See Eczema.
 Acarus Scabiei. See Potassium; Sozoiodolate—Scabies.
 Accessory Thyroid Bodies. See Goitre.
 Accoucheur's Hand. See Spasms in Children; Tetany.
 Accumulation, Fæcal. See Uterine Adnexa; Tumors of Ovaries.
 A. C. E. Mixture. See Chloroform.
 ACETANILID (*General Subject*). See Anilipyrin—Exalgin—Phenacetin—Salicylic Acid; Salicylbromanilid.
 ACETIC ACID (*General Subject*).
 Acetic Anhydride. See Hydracetic.
 Acetol-salicylic Ether. See Salicylic Acid; Salacetol.
 Acetone. See Acetonuria.
 ACETONURIA (*General Subject*). See Addison's Disease.
 ACETO-ORTHO-TOLUIDE (*General Subject*).
 Acetphenetidid. See Phenacetin.
 ACETYLENE (*General Subject*).
 Acetyl-methyl. See Acetonuria.
 Acetyl-phenyl-hydrazin. See Hydracetic.
 Achondroplasia. See Infantile Myxœdema.
 Achromatopsia. See Hysteria.
 Achylia Gastrica. See Stomach, Diseases of; Functional Diseases.
 Acid Dyspepsia. See Acid Gastritis (Index)—Dyspepsia, Acid (Index).
 Acid Gastritis. See Dyspepsia, Acid (Index)—Stomach, Diseases of; Chronic Gastritis—Stomach, Diseases of; Gastric Ulcer.
 Acidity of Stomach. See Sodium; Gastro-Intestinal Disorders.
 Acids, Poisoning by. See Magnesia.
 ACNE (*General Subject*). See Alumnol—Arsenic—Calcium—Chrysarobin—Creasote—Euophen—Gout—Hydrochloric Acid—Ichthyol—Iodine—Iodine; Iodism—Mercury; Oxides—Parasites; Trichina—Quinine—Sulphur; Cutaneous Disorders—Surgical Diseases of Skin and its Appendages; Milium—Thymol.
 Acne Indurata. See Phosphorus.
 Acne Inveterata. See Phosphorus.
 Acne Piccalis. See Pix Liquida; Poisoning.
 Acne, Pustular. See Potassium; Chlorate.
 ACNE ROSACEA (*General Subject*). See Resorcin—Seborrhœa; Oleosa.
 Acne, Strumous. See Strontium; Cutaneous Disorders.
 Acne, Tar. See Pix Liquida; Poisoning.
 Acneiform Eruption. See Pix Liquida; Poisoning.
 Acneiform Syphilide. See Acne Rosacea.
 ACONITE (*General Subject*).
 Aconite Poisoning. See Alcohol.
 ACONITINE (*General Subject*). See Toxic Foods; Ptomaines.
 Acoria. See Stomach, Diseases of; Functional Diseases.
 Acquired Syphilis in Children. See Syphilis; Congenital.
 ACROMEGALY (*General Subject*). See Animal Extracts; Pituitary—Animal Extracts; Thyroid—Elephantiasis.
 Actinomyces. See Actinomycosis.
 ACTINOMYCOSIS (*General Subject*). See Iodine—Phenic (Carbolic) Acid.
 ACTOL (*General Subject*). See Silver; Silver Lactate.
 Acupressure. See Vascular System; Injuries of Arteries; Rupture—Vascular System; Varix.
 Acupuncture. See Aneurism.
 Acute Anterior Poliomyelitis. See Poliomyelitis, Acute Anterior (Index).
 Acute Ascending Paralysis. See Spinal Cord; Landry's Paralysis.
 Acute Atrophic Paralysis. See Spinal Cord; Poliomyelitis.
 Acute Confusional Insanity. See Insanity.
 Acute Yellow Atrophy of Liver. See Jaundice; Toxæmia—Liver; Acute Yellow Atrophy of—Liver; Fatty—Phosphorus; Poisoning—Typhoid Fever; Complications—Valvular Diseases of Heart; Acute Endocarditis.
 ADDISON'S DISEASE (*General Subject*). See Animal Extracts; Suprarenal—Diabetes Mellitus—Scleroderma.
 Adenia. See Pseudoleukæmia.
 ADENITIS (*General Subject*). See Scarlet Fever.
 Adenitis, Cervical. See Specific Infectious Fevers; Relapsing.
 Adenitis, Scrofulous. See Iron.
 Adenitis, Tubercular. See Iodine.
 Adenocarcinoma of Endometrium. See Uterus; Carcinoma of Corpus Uteri.
 Adenocarcinoma of Rectum. See Tumors of Rectum and Anus; Malignant Growths.
 Adenofibroma of Breast. See Tumors of Breast.
 Adenoid Tissue of His. See Status Lymphaticus; Lymphadenoma.
 Adenoid Vegetations. See Chloroform—Croup; Catarrhal—Deaf-mutism—Nasal Cavities; Purulent Rhinitis—Nasal Cavities; Septum—Nasopharynx.
 Adenoma. See Tumors—Tumors; Epithelial (Organoid).
 Adenoma of Endometrium, Malignant. See Uterus; Carcinoma of Corpus Uteri.
 Adenoma of Intestines. See Intestines; Tumors.
 Adenoma of Kidney. See Urinary System, Diseases of (Surgical); Tumors of Kidney.
 Adenoma of Larynx. See Tumors of Larynx and Lungs; Larynx.
 Adenoma of Lung. See Tumors of Larynx and Lungs; Lungs.
 Adenoma of Maxillary Gland. See Salivary Glands; Tumors.
 Adenoma of Pancreas. See Pancreas; Tumors.
 Adenoma of Parotid Gland. See Salivary Glands; Tumors.
 Adenoma of Penis. See Penis and Testicles; Tumors.
 Adenoma of Pharynx. See Tonsils; Tumors.
 Adenoma of Rectum. See Tumors of Rectum and Anus; Benign.
 Adenoma of Suprarenal Capsules. See Suprarenal Capsules; Tumors.
 Adenoma of Testicles. See Penis and Testicles; Tumors of Testicles.
 Adenoma of Thyroid. See Goitre.
 Adenoma of Tongue. See Tongue; Tumors.
 Adenoma Sebaceum, Congenital. See Acne Rosacea.
 Adenoma, Uterine. See Menopause.
 Adenopathy, General. See Syphilis; Primary Local Changes from Infection.
 ADHATODA JUSTICIA (*General Subject*).
 ADHESOL (*General Subject*).
 Adiposis. See Fatty Heart and Obesity.
 Adolescent Rickets. See Spine, Diseases of; Scoliosis.
 Adonidin. See Adonis.
 Adonin. See Adonis.
 ADONIS (*General Subject*).
 Adrenal Disease. See Addison's Disease.
 Advancement, Capsular. See Strabismus.
 Advancement of Ocular Muscles. See Strabismus.
 Adynamia. See Wounds (Septic); Ergot Gangrene.
 Aërial Tumor. See Goitre.
 Æstivo-Autumnal Fever. See Malarial Fevers.
 Æstivo-Autumnal Parasite. See Malarial Fevers.
 African Fever. See Malarial Fevers.
 AGALACTIA (*General Subject*). See Jaborandi.
 Agaricic Acid. See Agaricin.
 AGARICIN (*General Subject*).
 Agaricus Arvensis. See Toxic Foods; Edible Mushrooms.

- Agaricus Campestris. See Toxic Foods; Edible Mushrooms.
- AGATHIN (*General Subject*).
- Agglutination of Intestinal Coils. See Stomach, Surgery of; Intestines; Anastomosis.
- Agraphia. See Aphasia—Vascular Diseases of Brain; Sylvian Artery.
- Ague. See Malarial Fevers—Morphinomania—Specific Infectious Fevers; Dengue.
- Ague, Brow-. See Neuralgia; Fifth Pair.
- Ague-cake. See Malarial Fevers.
- AILANTUS (*General Subject*).
- AINHUM (*General Subject*). See Leprosy.
- Aiodine. See Animal Extracts; Thyroid.
- Air in Pericardium. See Pericardium; Pneumopericardium.
- Air, Insufflation of. See Obstruction, Intestinal.
- Air-embolism of Brain. See Vascular Diseases of Brain; Embolism.
- AIROL (*General Subject*). See Iodine.
- Aix-les-Bains Spring-water. See Gout.
- Alalia. See Aphasia.
- ALANGINE (*General Subject*).
- Albinism. See Iris.
- Albolene. See Tuberculosis of Lungs; Complications.
- Albumin in Urine. See Albuminuria (Index).
- Albumin, Nucleo-. See Nucleo-albumin (Index).
- Albumin, Tests for. See Albuminuria; Tests—Salicylic Acid; Salicyl-sulphuric Acid.
- Albumin Salt Solution. See Insanity.
- Albuminoid Infiltration of Liver. See Liver; Amyloid.
- Albumin-water. See Infants, Diarrheal Diseases of.
- ALBUMINURIA (*General Subject*). See Bright's Disease—Cantharides—Cerebral Hemorrhage—Chloroform; Contra-indications—Diabetes Mellitus—Digitalis—Diphtheria—Eclampsia—Erythema Scarlatiniforme—Ether; Contra-indications—Exophthalmic Goitre—Fatty Heart—Infants, Diarrheal Diseases of—Influenza—Iodine; Physiological Action—Iron—Jaundice; Acute Infectious—Leukæmia—Liver; Amyloid—Malarial Fevers; Hematuria—Male Fern; Poisoning—Measles—Methylene-blue—Myocarditis—Parturition; Abnormal—Pemphigus—Pertussis—Pneumonia, Catarrhal—Pneumonia, Lobar—Rheumatism; Acute—Salicylic Acid; Contra-indications—Salol; Poisoning—Scarlet Fever—Strontium; Genito-Urinary Disorders—Tumors of Brain; Tumors of Pons—Typhoid Fever—Uremia—Urinary System, Diseases of; Amyloid Kidneys—Urinary System, Diseases of; Pyelitis—Uterine Adnexa; Tumors of Ovaries—Variola—Wounds (Septic) and Gangrene; Pyæmia—Wounds (Septic) and Gangrene; Septicæmia—Yellow Fever.
- Albuminuria, Cardiac. See Potassium; Cobalt-nitrite.
- Albuminuria, Tests for. See Albuminuria.
- Albuminuria, Transient. See Syphilis; General Infection.
- Albuminuric Retinitis. See Retinitis, Albuminuric (Index).
- ALCOHOL (*General Subject*). See Alcoholism—Cirrhosis of the Liver—Insanity; Acute Confusional—Nursing; Breast-milk—Pneumonia, Lobar.
- Alcohol Eruption. See Erythema Scarlatiniforme.
- Alcohol, Excess in. See Angina Pectoris.
- Alcohol Habit. See Hypnotism.
- Alcohol, Injections of. See Tumors of Breast.
- Alcohol Intoxication. See Opium.
- Alcohol, Poisoning by. See Hysteria.
- Alcoholic Amaurosis. See Nux Vomica.
- Alcoholic Amblyopia. See Amblyopia, Alcoholic (Index).
- Alcoholic Cirrhosis. See Potassium; Purgatives.
- Alcoholic Drinks. See Gout.
- Alcoholic Inebriety. See Alcoholism.
- Alcoholic Intoxication. See Intoxication, Alcoholic (Index).
- Alcoholic Mania, Acute. See Alcoholism.
- Alcoholic Meningitis. See Tumors of Brain.
- ALCOHOLIC NEURITIS (*General Subject*). See Beriberi—Nerves, Peripheral; Multiple Neuritis.
- Alcoholic Paralysis. See Alcoholic Neuritis.
- Alcoholic Pneumonia. See Pneumonia; Lobar.
- Alcoholic Tremor. See Tremors; Tremor.
- Alcoholics. See Wounds and Injuries of Thorax; Puncture of Heart.
- ALCOHOLISM (*General Subject*). See Ammonia—
- Ammonium—Bright's Disease—Cocainomania—Deaf-mutism—Digitalis—Elaterium—Fatty Heart—Gelsemium—Gold—Ichthyol—Insanity; General Paresis—Insolation—Jaborandi—Lupulus—Meningitis; Leptomenigitis—Middle Ear; Chronic Otitis—Morphinomania—Nux Vomica—Paraldehyde—Peritoneum; Chronic Peritonitis—Phosphorus—Strychnine; Gastro-Intestinal Disorders.
- ALCOHOLISM, COMBUSTION DURING, OR SPONTANEOUS COMBUSTION (*General Subject*).
- Alcoholism, Vomiting of. See Ipecac.
- ALDEPALMITIC ACID (*General Subject*).
- Ale. See Alcohol—Malt.
- ALEMBROTH (*General Subject*).
- Aleuronat Bread. See Diabetes Mellitus.
- Alexander's Operation. See Operation, Alexander's (Index).
- Alexia. See Aphasia.
- ALEXINS (*General Subject*).
- Alibert's Keloid. See Surgical Diseases of the Skin and its Appendages; Keloid.
- Alimentary Glycosuria. See Glycosuria, Alimentary (Index).
- Alimentation, Rectal. See Olive-oil—Pancreatin.
- Alkalies, Poisoning by. See Hydrochloric Acid.
- Alkaline Carbonate. See Sodium.
- ALKALOIDS (*General Subject*).
- Alkaloids, Vegetable. See Toxic Foods; Ptomaines.
- Allingham's Operation. See Hemorrhoids.
- Allis's Inhaler. See Ether.
- Allochiria. See Locomotor Ataxia.
- ALLYL (*General Subject*).
- Almén-Schonbein's Test. See Hematuria.
- Aimonds, Artificial Oil of Bitter. See Nitrobenzene.
- ALOES (*General Subject*).
- Aloin. See Aloes.
- ALOPECIA (*General Subject*). See Acetic Acid—Cantharides—Jaborandi—Petroleum—Quinine—Resorcin—Sulphur; Cutaneous Disorders.
- ALOPECIA ARATA (*General Subject*). See Syphilis.
- Alopecia Circumscripta. See Thymol.
- Alopecia Furfuracea. See Scabborrhæa; Sicca.
- Alopecia, Premature Idiopathic. See Alopecia Areata.
- Alopecia, Syphilitic. See Syphilitic Alopecia (Index).
- Alphanaphthol. See Naphthalin.
- ALPHOL (*General Subject*).
- Alterative. See Aiol—Aristol—Arsenic—Barium—Bromine and its Derivatives—Calcium—Chaulmugra-oil—Colchicum—Europen—Gold—Guaiac—Ichthyol—Iodine and Derivatives—Mercury—Phosphorus—Salicylic Acid; Mercuric Salicylate—Salicylic Acid; Theobromine and Sodium Iodosalicylate—Silver—Silver; Arsenite.
- Alterative, Stimulant. See Turpentine.
- Alternating Insanity. See Insanity; Recurrent.
- Alternating Strabismus. See Strabismus.
- ALUM (*General Subject*).
- ALUMINIUM (*General Subject*).
- ALUMNOL (*General Subject*). See Stomach, Diseases of; Gastric Ulcer—Tuberculosis of Lung; Complications.
- Alveolar Abscess. See Jaws.
- Alveolar Ectasis. See Pulmonary Emphysema; Vesicular.
- Alveolo-periostitis. See Diabetes Mellitus.
- Amanita Muscaria. See Toxic Foods; Poisonous Mushrooms.
- Amanita Muscaria Mushroom. See Toxic Foods; Ptomaines.
- Amanita Phalloides. See Toxic Foods; Poisonous Mushrooms.
- Amaurosis. See Antipyrine; Poisoning—Blindness (Index)—Hydrocephalus, Acute—Hysteria—Lead; Chronic Poisoning—Locomotor Ataxia—Male Fern; Poisoning—Quinine; Physiological Action—Strychnine; Nervous Disorders.
- Amaurosis, Alcoholic. See Nux Vomica.
- Amaurosis, Lead. See Nux Vomica.
- Amaurosis, Tobacco. See Nux Vomica.
- Amaurosis, Transitory. See Eclampsia.
- Amaurosis, Uræmic. See Bright's Disease.
- Amaurotic Family Idiocy. See Optic Nerve and Retina; Retinitis.
- Amaurotic Tabes. See Locomotor Ataxia.
- Amblyopia. See Bright's Disease, Chronic—Gelsemium; Physiological Action—Malarial Fevers—Salicylic Acid; Poisoning.

- Amblyopia, Alcoholic. See Jaborandi—Toxic Amblyopia.
- Amblyopia, Crossed. See Hysteria.
- Amblyopia Ex Abusa. See Toxic Amblyopia; Alcoholic.
- Amblyopia, Tobacco. See Jaborandi—Toxic Amblyopia.
- Amblyopia, Toxic. See Toxic Amblyopia.
- Ambulatory Splints. See Fractures.
- AMENORRHOEA (*General Subject*). See Acromegaly—Aloes—Animal Extracts; Ovarian—Apiol—Cantharides—Chlorosis—Cimicifuga—Gold—Guaiac—Iron—Manganese—Menstruation, Suppressed (Index)—Morphinomania—Nux Vomica—Quinine—Uterine Adnexa; Tumors of Ovaries—Uterus; Malformations.
- American Hellebore. See Veratrum Viride.
- Amido-aceto-phenetidin. See Phenocoll.
- Amimia. See Aphasia.
- AMINOL (*General Subject*).
- AMMONIA (*General Subject*). See Laryngitis; Edema.
- Ammoniacal Urine. See Cystitis.
- Ammoniaemia. See Urinary System, Diseases of; Pyelitis.
- AMMONIUM (*General Subject*).
- Amnesia. See Neurasthenia—Vascular Diseases of Brain; Thrombosis.
- Amœba Coli. See Dysentery.
- Amœba Coli in Sputum. See Liver; Abscess.
- Amœbic Abscess. See Liver; Abscess.
- Amœbic Dysentery. See Quinine.
- Amœbic Enteritis. See Dysentery; Amœbic.
- Amotility, Gastric. See Stomach, Diseases of; Functional Diseases.
- Amphoric Breathing. See Tuberculosis of Lungs.
- Amputation. See Fractures; Compound—Joints; Arthritis—Nerves, Peripheral; Neoplasms—Wounds (Septic); Gangrene.
- Amputation, Hip-joint. See Hip-joint Disease.
- Amputation Neuroma. See Tumors; Neurofibroma.
- Amygdalitis. See Nucleus.
- AMYGDOPHENIN (*General Subject*).
- Amyl-alcohol. See Alcohol—Amylene—Amylene-hydrate.
- Amyl-hydride. See Pentane.
- Amyl-nitrite. See Nitrites—Pneumonia; Lobar.
- Amyl-nitrite Eruption. See Dermatitis Medicamentosa.
- Amyl-nitrite, Poisoning by. See Glycosuria.
- AMYL-VALERIANATE (*General Subject*).
- AMYLENE (*General Subject*).
- AMYLENE-HYDRATE (*General Subject*).
- AMYLIFORM (*General Subject*).
- Amyloid Degeneration. See Actinomycosis—Burns—Malarial Fevers—Pseudoleukæmia.
- Amyloid Degeneration of Kidneys. See Amyloid Kidney (Index).
- Amyloid Degeneration of Liver. See Amyloid Liver (Index).
- Amyloid Disease of Conjunctiva. See Conjunctiva.
- Amyloid Kidney. See Surgical Diseases; Secondary Wound Fever—Urinary System, Diseases of.
- Amyloid Liver. See Amyloid Degeneration of Liver (Index)—Liver, Diseases of—Liver; Fatty—Surgical Diseases; Secondary Wound Fever.
- Amylopsin. See Pancreatin.
- Amyotrophic Lateral Sclerosis. See Spinal Cord, Diseases of—Spinal Cord; Myelitis—Spinal Cord; Primary Lateral Sclerosis.
- Anadenia Ventriculi. See Stomach, Diseases of; Functional; Secretory Neuroses.
- ANÆMIA (*General Subject*). See Animal Extracts; Bone-marrow—Animal Extracts; Splenic—Arsenic—Bright's Disease; Chronic—Copper—Fatty Heart—Hydracetic; Poisoning—Iron—Lead; Chronic Poisoning—Leukæmia—Magnesia—Malarial Fevers—Manganese—Mercury; Chlorides—Miliary Fever—Naso-pharynx; Adenoids—Naso-pharynx; Chronic Naso-pharyngitis—Nucleins—Nux Vomica—Oxygen—Ozone—Parasites; Intestinal; Anchylostoma—Parasites; Tape-worms; Bothrioccephalus—Parasites; Trichina—Phosphoric Acid—Pleura; Echinococcus—Pneumokoniosis—Phosphorus—Pregnancy, Disorders of—Pseudoleukæmia—Quinine—Rheumatism; Chronic Articular—Salol—Scorbutus, Infantile—Specific Infectious Fevers; Malta—Spleen; Hypertrophy—Stomach, Diseases of; Carcinoma—Stomach, Diseases of; Chronic Gastritis—Stomach, Diseases of; Functional; Achylia Gastrica—Stomach, Diseases of; Gastric Ulcer—Syphilis; General Infection—Tuberculosis of Lungs; Chronic Ulcerative Phthisis—Tumors of Brain—Typhoid Fever—Urinary System, Diseases of; Amyloid Kidney—Uterine Adnexa; Acquired Malformations of Ovaries—Uterus; Carcinoma of Cervix Uteri—Uterus; Inversion—Uterus; Myoma—Uterus; Sarcoma—Valvular Diseases of Heart; Aortic Regurgitation—Valvular Diseases of Heart; Aortic Stenosis—Wounds and Injuries of Thorax; Hæmorrhage.
- Anæmia, Benign. See Anæmia, Pernicious.
- Anæmia, Brick-makers'. See Parasites, Intestinal; Anchylostoma.
- Anæmia, Cerebral. See Cerebral Anæmia (Index).
- Anæmia, Ceylon. See Beriberi.
- Anæmia, Hydræmic. See Infantile Myxœdema.
- Anæmia, Mountain. See Parasites; Intestinal; Anchylostoma—Specific Infectious Fevers; Dengue.
- Anæmia of Nerves. See Nerves, Peripheral.
- Anæmia of Nursing Women. See Phosphorus; Phosphate.
- ANÆMIA, PERNICIOUS (*General Subject*). See Addison's Disease—Anæmia—Animal Extracts; Bone-marrow—Arsenic—Chlorosis—Erythroxylin Coca—Malarial Fevers—Mercury; Chlorides—Optic Nerve and Retina; Retinitis—Oxygen—Phosphorus—Stomach, Diseases of; Carcinoma.
- Anæmia, Tunnel. See Parasites, Intestinal; Anchylostoma.
- Anæsthesia. See Acetonuria—Hypnotism—Hysteria—Nerves, Wounds and Injuries of—Pseudoleukæmia—Spasms in Children; Hysteria—Spinal Cord; Landry's Paralysis—Spinal Cord; Myelitis—Spine, Diseases of; Sprain—Spine, Diseases of; Tumors—Syphilis; Syphilides—Tumors of Brain; Tumors of Base.
- Anæsthesia, Chloroform. See Nitrites.
- Anæsthesia, Collapse of. See Coffee.
- Anæsthesia, Cutaneous. See Spine, Diseases of; Spinal Localization.
- Anæsthesia, Ether. See Vascular System; Vascular Obstruction; Fat-embolism.
- Anæsthesia, Gastric. See Stomach, Diseases of; Functional Diseases.
- Anæsthesia, General. See Sulphonal; Poisoning.
- Anæsthesia, Infiltration. See Erythroxylin Coca.
- Anæsthesia of Pharynx. See Erythroxylin Coca and Cocaine; Topical Administration.
- Anæsthesia of Vagina. See Erythroxylin Coca; Topical Administration.
- Anæsthesia of Vulva. See Erythroxylin Coca; Topical Administration.
- Anæsthesia, Rectal. See Erythroxylin Coca; Topical Administration.
- Anæsthetic, General. See Amylene—Bromide of Ethyl—Chloroform—Chloroform; A. C. E. Mixture—Ether—Nitrous Oxide—Pental—Pentane.
- Anæsthetic, Local. See Amylene—Anesin—Antipyrine—Camphor—Corn-ergot and Corn-silk—Erythroxylin Coca and Cocaine—Ether—Ethyl-chloride—Guaiacol—Menthol—Orthoform—Pental—Petroleum; Rhigolene—Phenic (Carbolic) Acid—Salol; Camphorated.
- Anæsthetic Leprosy. See Leprosy.
- Anal. See Anus (Index).
- Anal Dilatation. See Hæmorrhoids.
- Anal Fissure. See Atropine—Benzoin—Chloral—Ichthyol—Magnesia.
- Anal Fistula. See Potassium; Caustics—Rectum and Anus.
- Anal Pruritus. See Parasites, Intestinal; Oxyuris.
- Anal Stricture. See Constipation.
- ANALGEN (*General Subject*). See Malarial Fevers.
- Analgesia. See Hypnotism—Hysteria—Locomotor Ataxia—Syphilis; Syphilides.
- Analgesia of Fingers. See Spinal Cord; Syringomyelia.
- Analgesia of Hands. See Spinal Cord; Syringomyelia.
- Analgesia of Testicles. See Locomotor Ataxia.
- Analgesic. See Acetanilid—Analgen—Anilipyrin—Antipyrine—Atropine—Belladonna—Bromine and its Derivatives—Camphor—Cannabis Indica—Chloral—Cimicifuga—Creosote—Exalgol—Gaultheria—Guaiacol—Hydracetic—Ichthyol—Mentha—Methylene-blue—Naphthol Compounds—Opium and Derivatives—Orthoform—Phenacetin—Phenocoll—Picric Acid—Resorcin—Salicylic Acid; Antipyrine Salicylate—Salicylic Acid; Po-

- tassium Salicylate—Salicylic Acid; Salicyl-para-phenetidin—Salicylic Acid; Salicylamid—Salicylic Acid; Sodium Borosalicylate—Salicylic Acid; Sodium Dilodosalicylate—Salol—Salol; Camphorated—Salophen—Thymol; Thymacetin.
- Analgesine. See Antipyrine.
- Anaphrodisiac. See Bromine and its Derivatives—Camphor—Digitalis.
- Anaplasty. See Plastic Surgery.
- Anasarca. See Colchicum—Jalap—Magnesia—Tremors; Paralysis Agitans—Valvular Diseases of Heart; Aortic Regurgitation—Valvular Diseases of Heart; Tricuspid Regurgitation—Vascular System; Vascular Obstruction; Thrombosis.
- Anastomosis, Intestinal. See Stomach, Surgery of; Intestines.
- Anastomosis, Uretero-Ureteral. See Urinary System, Diseases of (Surgical).
- Anastomotic Forceps, Laplace's. See Stomach, Surgery of; Intestines; Anastomosis.
- Anatomical Tubercle. See Tuberculosis of Skin; Lupus Erythematosus.
- Anatomical Tuberculosis. See Surgical Diseases of the Skin and its Appendages; Verrucae.
- Anchylostoma Duodenale. See Beriberi—Parasites; Intestinal.
- Anchylostomiasis. See Parasites; Intestinal; Anchylostoma.
- Anderson's Dusting-powder. See Herpes Zoster.
- ANEMONIN (*General Subject*).
- ANESIN (*General Subject*).
- ANEURISM (*General Subject*). See Abscess—Asthma—Barium—Digitalis—Mediastinum; Abscess—Mediastinum; Tumors—Oesophagus; Stricture—Pulmonary Circulation; Hæmorrhage—Tumors of Brain—Vascular System; Arteritis—Vascular System; Injuries of Arteries; Contusion—Veratrum Viride.
- Aneurism, Abdominal. See Aneurism.
- Aneurism, Aortic. See Aneurism—Strontium; Cardiac Disorders—Valvular Diseases of Heart; Aortic Regurgitation.
- Aneurism, Arterio-Venous. See Aneurism.
- Aneurism, Axillary. See Aneurism.
- Aneurism, Brachial. See Aneurism.
- Aneurism, Cardiac. See Myocarditis.
- Aneurism, Gluteal. See Hip-joint Disease.
- Aneurism, Miliary. See Meningitis; Leptomenigitis—Syphilis; Period of Sequelæ.
- Aneurism of Pharynx. See Tonsils; Tumors.
- Aneurism, Subclavian. See Aneurism.
- Aneurism, Thoracic. See Valvular Diseases of Heart; Aortic Stenosis.
- Aneurism, Traumatic. See Dislocations.
- Aneurismal Varix. See Aneurism.
- Anger's Operation. See Urinary System, Surgical Diseases of; Hypospadias.
- Angina. See Guaiacol—Ichthyol—Rubella—Salol—Scarlet Fever—Sore Throat (Index)—Syphilis; Infectious Secretions.
- Angina, Follicular. See Aluminium—Camphor.
- Angina Ludovici. See Laryngitis; Symptomatic.
- Angina Maligna. See Diphtheria.
- Angina, Painful. See Orthoform.
- ANGINA PECTORIS (*General Subject*). See Belladonna—Bromides—Chloral—Epilepsy; Cardiac—Fatty Heart—Gout—Herpes Zoster—Hydrogen Dioxide—Influenza—Locomotor Ataxia—Myocarditis—Nitrites—Nitroglycerin—Phosphorus—Pyridin—Strontium; Cardiac Disorders—Sulphonal—Valvular Diseases of Heart; Aortic Regurgitation—Vascular System; Arteriosclerosis—Vascular—Cardiac Neuroses; Rapid Heart.
- Angina Pectoris, Epileptiform. See Zinc; Nervous Disorders.
- Angina, Phlegmonous. See Silver; Unguentum Credé.
- Angina, Simple Catarrhal. See Rheumatism; Muscular.
- Anginose Sore Throat. See Potassium; Chlorate.
- Angiocholitis. See Liver.
- Angioid Streaks. See Optic Nerve and Retina; Retinitis.
- Angiokeratoma. See Tumors; Angiomata.
- Angioleucitis. See Status Lymphaticus; Lymphangitis.
- Angioma. See Tumors—Tumors; Connective Tissue.
- Angioma, Cavernous. See Tumors—Tumors; Angiomata.
- Angioma, Intestinal. See Intestines, Tumors.
- Angioma of Conjunctiva. See Conjunctiva, Tumors.
- Angioma of Intestine. See Intestines; Tumors.
- Angioma of Kidney. See Urinary System, Diseases of (Surgical); Tumors of Kidney.
- Angioma of Larynx. See Tumors of Larynx and Lungs; Larynx.
- Angioma of Liver. See Liver; Tumors.
- Angioma of Rectum. See Tumors of Rectum and Anus; Benign.
- Angioma of Tongue. See Tongue; Tumors.
- Angioma, Orbital. See Orbit; Tumors.
- Angioma, Plexiform. See Tumors; Connective Tissue.
- Angioma, Uterine. See Endometritis.
- Angiomatous Lupus. See Tuberculosis of Skin; Lupus Vulgaris.
- Angioneurosis. See Respiratory Organs; Nasal Reflex Neuroses.
- Angiospasm. See Nitrites.
- Anguilla Stercoralis. See Parasites.
- Anhalonine. See Anhalonium Lewinii.
- ANHALONIUM LEWINII (*General Subject*).
- Aniline. See Resorcin; Hydroquinone.
- ANILIPYRIN (*General Subject*).
- ANIMAL EXTRACTS (*General Subject*).
- Aniridia. See Iris.
- Anisocoria. See Cerebral Hæmorrhage.
- Ankle, Ankylosis of. See Sprains.
- Ankle, Dislocation of. See Dislocations.
- Ankle-clonus. See Cerebral Hæmorrhage—Hysteria—Spinal Cord; Amyotrophic Sclerosis—Spinal Cord; Primary Lateral Sclerosis.
- Ankles, Oedema of. See Oedema of Ankles (Index).
- Ankyloblepharon. See Palpebræ; Acquired Anomalies.
- Ankyloglossia. See Tongue; Tongue-tie.
- Ankylosis. See Joints—Muscles; Ossifying Myositis—Rheumatism; Acute—Rheumatism; Chronic Articular.
- Ankylosis of Ankle. See Sprains.
- Ankylosis of Vertebrae. See Spine, Diseases of; Tuberculosis.
- Annulus, Senilis. See Cornea, Opacities of.
- Anodyne. See Aconite—Cannabis Indica—Cajuput-oil—Chloral—Hyoscyamus—Ichthyol—Orthoform.
- Anomalous Epilepsy. See Spasms in Children; Automatic Movements.
- Anophthalmos. See Orbit.
- Anorchism. See Penis and Testicles; Anomalies of Testicles.
- Anorexia. See Cannabis Indica—Hysteria—Insanity—Intestines, Tumors—Leukæmia—Phosphorus; Poisoning—Specific Infectious Fevers; Dengue—Stomach, Diseases of; Carcinoma—Stomach, Diseases of; Dilatation—Stomach, Diseases of; Functional Diseases—Syphilis; General Infection—Toxic Foods; Grain Poisoning—Typhoid Fever—Vascular System; Phlegmasia Alba Dolens—Wounds (Septic) and Gangrene; Septicæmia—Yellow Fever—Zinc; Physiological Action.
- Anorexia, Infantile. See Nursing.
- ANOREXIA NERVOSA (*General Subject*).
- Anosmia. See Respiratory Organs; Nasal Neuroses.
- Antacid. See Ammonia—Calcium—Cerium—Magnesia—Potassium—Sodium; Gastro-Intestinal Disorders.
- Anteflexion of Uterus. See Uterus, Anteflexion (Index).
- Antemetic. See Atropine—Bismuth—Cerium—Creasote—Erythroxylon Coca and Cocaine—Ipecac—Menthol—Nitroglycerin—Potassium.
- Anterior Horns, Myelitis of. See Spinal Cord; Poliomyelitis.
- Anterior Poliomyelitis, Acute. See Chorea.
- Anteversion of Uterus. See Uterus, Anteversion of (Index).
- Anthelmintic. See Ailantus—Cajuput-oil—Male Fern—Naphthalin—Pelletierine—Quassia—Salicylic Acid—Thymol.
- Anthemism Nobilis. See Chamomile.
- Anthracosis. See Pneumonokoniosis.
- ANTHRAROBIN (*General Subject*).
- ANTHRAX (*General Subject*). See Actol—Creasote—Diabetes Mellitus—Erysipelas—Hydrogen Dioxide—Ipecac—Mercury—Pix Liquida; Pixol—Silver; Silver and Potassium Cyanide—Surgical Diseases of the Skin and its Appendages; Carbuncle.
- Anthrax Bacillus. See Potassium; Aurocyanide.

- Anthrax, Benignant. See Surgical Diseases of the Skin and its Appendages; Carbuncle.
 Anticonic. See Resorcin.
 Antidiphtheric Serum. See Nasal Cavities; Atrophic Rhinitis.
 Antifebrin. See Acetanilid.
 Antifebrin Eruption. See Erythema Medicamentosum.
 Antifermentative. See Ammonia—Amylform—Bismuth—Hydrochloric Acid—Phenic (Carbolic) Acid—Salicylic Acid.
 Antigalactagogue. See Atropine—Belladonna—Camphor.
 Antihydrotic. See Salicylic Acid.
 Antimonium and Potassium Tartrate. See Potassium.
 Antinervine. See Salicylic Acid; Salicylbromanilid.
 Antinosen. See Vascular System; Varix.
 Antiparasitic. See Cajuput-oil—Hydracetic—Naphthalin.
 Antiperiodic. See Acetanilid—Arsenic—Cinchona—Eucalyptus—Methylene-blue—Quebracho—Quinine.
 Antiphlogistic. See Digitalis—Ichthyol—Mercury—Phenic (Carbolic) Acid—Potassium.
 Antipruritic. See Creasote—Ichthyol—Jaborandi—Lithium—Menthol—Mercury; Oxides—Phenic (Carbolic) Acid—Salicylic Acid.
 Antipyretic. See Acetanilid—Aceto-ortho-toluid—Aconite—Analgen—Anilipyrin—Antipyrine—Asaprol—Benzanilid—Benzoic Acid—Chloral—Cinchona—Creasote—Digitalis—Gaultheria—Guaiacol—Hydracetic—Naphthol Compounds—Phenacetin—Phenocoll—Quinine—Resorcin—Salicylic Acid and the Salicylates—Salol—Salophen—Thymol.
 ANTIPIRYNE (*General Subject*). See Anilipyrin—Croup; Catarrhal—Diabetes Mellitus—Induenza—Mouth; Herpes Zoster—Nursing; Breast-milk—Resorcin; Resopyrin.
 Antipyrine Eruption. See Dermatitis Medicamentosa—Erythema Medicamentosum—Erythema Searlatiniforme.
 Antipyrinum. See Antipyrine.
 Antiseptic. See Acetanilid—Acetic Acid—Actol—Aiol—Alcohol—Alphol—Aluminium—Aminol—Ammonia—Ammonium—Amylene—Amylform—Antipyrine—Argentamine—Argonin—Aristol—Asaprol—Aseptic Acid—Benzoic Acid—Benzoin—Bismuth—Boric Acid—Calcium—Camphor—Chloral—Chronic Acid—Cinchona—Cinnamon—Coffee and Caffeine—Copaiba—Copper—Creasote—Cubeb—Eucalyptus—Euphen—Formaldehyde—Gaultheria—Glycerin—Hydrogen Dioxide—Ichthyol—Iodine and Derivatives—Mercury—Methyl-blue—Mustard—Naphthalin—Naphthol Compounds—Orthoform—Petroleum—Phenacetin—Phenacetyl; Iodophenol—Phenic (Carbolic) Acid—Phenocoll—Picric Acid—Pix Liquida; Derivatives and Allied Compounds—Potassium; Soziodolate—Pyrogallol—Quebracho—Quinine—Resorcin—Salicylic Acid and the Salicylates—Salol—Salol; Camphorated—Salophen—Silver—Silver; Argentamine—Silver; Argonin—Silver; Silver Arsenite—Silver; Silver Chloride—Silver; Silver Citrate—Silver; Silver Lactate—Silver; Silver and Potassium Cyanide—Sodium—Thymol.
 Antiseptic, Antizymotic. See Sulphur; Fumigation.
 Antiseptic, Intestinal. See Intestinal Antiseptic (Index).
 Antiseptol. See Cinchona—Iodine.
 Antispasmin. See Salicylic Acid.
 Antispasmodic. See Acetanilid—Amyl-valerianate—Anhalonium Lewinii—Antipyrine—Apomorphine—Atropine—Belladonna—Bromine and its Derivatives—Cajuput-oil—Camphor—Cannabis Indica—Cerium—Chamomile—Curara—Eucalyptus—Gelsemium—Grindelia—Hyoscyamus—Lobelia—Lupulus—Mentha—Musk—Nitrites—Nitroglycerin—Paraldehyde—Petroleum—Physostigma—Quinine—Resorcin—Salicylic Acid; Antispasmin.
 Antistreptococcic Serum. See Serum, Antistreptococcic (Index).
 Antisudorific. See Agaricin—Aristol—Camphor—Potassium; Tellurate.
 Antithermic. See Quebracho.
 Antitoxin. See Croup; Membranous—Intubation.
 Antitoxin Eruption. See Diphtheria.
 Antitoxin Serum. See Serum, Antitoxin (Index).
 Antitoxin, Tetanus. See Tetanus.
 Antitoxin, Thyro-. See Animal Extracts; Thyroid.
 Antitubercle Horse-serum. See Tuberculosis of Larynx.
 Antivenine, Calmette's. See Leprosy.
 Antivenomous Serum, Calmette's. See Wounds and Stings; Snake-bites.
 Antizymotic. See Resorcin.
 Antizymotic Antiseptic. See Sulphur; Fumigation.
 Antral Suppuration. See Sinuses; Antrum—Sinuses; Ethmoiditis.
 Antritis. See Middle Ear; Mastoid Empyema.
 Antrum, Inflammation of. See Sinuses.
 Antrum of Highmore, Abscess of. See Phenic Acid; Chlorphenol.
 Antyllus's Operation. See Aneurism.
 Anuria. See Abdomen—Cholera Asiatica—Iodine—Juniper—Mercury—Obstruction, Intestinal—Rheumatism; Acute—Toxic Foods; Muscarine Poisoning—Toxic Foods; Shell-fish Poisoning—Yellow Fever.
 Anus. See Anal (Index).
 Anus, Artificial. See Stomach, Surgery of; Intestines; Anastomosis—Stomach, Surgery of; Intestines; Resection.
 Anus, Pissure of. See Rectum and Anus.
 Anus, Imperforate. See Stomach, Surgery of; Intestines; Enterotomy.
 Anus, Fruritus of. See Fruritus Ani (Index).
 Anus, Tumors of. See Tumors of Rectum and Anus.
 Aorta, Atheroma of. See Atheroma of Aorta (Index).
 Aortic Aneurism. See Aneurism, Aortic (Index).
 Aortic Constriction. See Vasculo-Cardiac Neuroses; Irregular Heart.
 Aortic Insufficiency. See Apocynum Cannabinum—Nitrites—Salicylic Acid; Theobromine and Sodium Iodosalicylate.
 Aortic Regurgitation. See Digitalis—Dilatation of the Heart—Hypertrophy of Heart—Myocarditis—Valvular Diseases of Heart; Aortic Regurgitation—Valvular Diseases of Heart; Aortic Stenosis—Valvular Diseases of Heart; Mitral Stenosis—Valvular Diseases of Heart; Pulmonary Regurgitation.
 Aortic Stenosis. See Digitalis—Hypertrophy of the Heart—Myocarditis—Valvular Diseases of Heart.
 Apepsia, Infantile. See Pepsin.
 Apex-murmur, Systolic. See Valvular Diseases of Heart; Aortic Regurgitation.
 Aphakia. See Lens.
 APHASIA (*General Subject*). See Cerebral Hemorrhage—Deaf-mutism—Encephalitis—Influenza—Insanity; Acute Confusional—Insanity; Syphilis—Sulphonal; Physiological Action—Sulphonal; Poisoning—Tumors of Brain—Vascular Diseases of Brain; Embolism—Vascular Diseases of Brain; Sylvian Artery—Vascular Diseases of Brain; Thrombosis—Vascular System; Arteriosclerosis.
 Aphasia, Mnemonic. See Insanity; Consecutive Insanity.
 Aphasia, Motor. See Wounds of Head; Wounds of Brain.
 Aphemia. See Aphasia.
 Aphonia. See Belladonna—Hysteria—Leukemia—Neuralgia; Migraine—Toxic Foods; Shell-fish Poisoning—Tuberculosis of Larynx.
 Aphonia, Hysterical. See Respiratory Tract; Laryngeal Neuroses—Zinc; Nervous Disorders.
 Aphrodisiac. See Cannabis Indica—Cantharides—Cotton-plant.
 Aphrosia. See Aphasia.
 Aphthæ. See Alcohol—Laryngitis; Symptomatic—Potassium; Chlorate—Resorcin—Sodium; Gastro-Intestinal Disorders.
 Aphthæ, Bednar's. See Mouth and Lips, Diseases of.
 Aphthous Fever. See Mouth; Foot-and-Mouth Disease.
 Anthon's Stomatitis. See Copper—Mouth.
 APIOL (*General Subject*).
 Apioline. See Apol.
 Apocodeine. See Opium.
 Apocynin. See Apocynum Cannabinum.
 APOCYNUM CANNABINUM (*General Subject*).
 Apolysin. See Phenacetin.
 APOMORPHINE (*General Subject*).
 Apomorphine Hydrochlorate. See Alkaloids
 Apoplectic Attacks. See Fatty Heart.

- Apoplectic Condition. See Wounds of Head; Compression of Brain.
- Apoplexy. See Alcoholism—Bright's Disease; Chronic—Cerebral Hemorrhage—Colocynth—Ergot—Glycosuria—Insanity—Malarial Fevers; Pernicious—Meningitis; Pachymeningitis—Middle Ear; Chronic Otitis—Opium—Syphilis; Period of Sequelæ—Vascular Diseases of Brain; Embolism—Wounds of Head; Extradural Hemorrhage.
- Apoplexy, Cerebral. See Cerebral Apoplexy (Index).
- Apoplexy, Follicular. See Uterine Adnexa; Acquired Malformations of Ovaries.
- Apoplexy, Heat. See Insolation.
- Apoplexy, Labyrinthine. See Internal Ear; Effusion.
- Apoplexy, Pancreatic. See Pancreas; Hemorrhage.
- Apoplexy, Pulmonary. See Pulmonary Circulation; Hemorrhage.
- Apoplexy, Retinal. See Optic Nerve and Retina; Retinitis.
- Apparatus, Goldthwaite's. See Spine, Diseases of; Tuberculosis.
- Apparatus, Whitman. See Spine, Diseases of. Tuberculosis.
- APPENDICITIS (*General Subject*). See Abdomen—Cholelithiasis—Intestines; Typhlitis—Potassium; Purgatives—Pregnancy, Disorders of—Stomach, Surgery of; Intestines; Thrombosis—Urinary System, Diseases of (Surgical); Movable Kidney.
- Appendicitis, Gangrenous. See Liver; Empyema of Gall-bladder.
- Appendicitis, Suppurative. See Liver; Abscess.
- Appendicular Abscesses. See Appendicitis.
- Appendix Vermiformis, Ruptured. See Peritoneum; Acute Peritonitis.
- Apraxia. See Aphasia—Wounds of Head; Wounds of Brain.
- Aprosexia. See Naso-pharynx; Adenoids.
- Aptalism. See Jaborandi.
- Aqua Fortis. See Nitric Acid.
- Araroba Ointment. See Chrysarobin.
- Araroba Powder. See Chrysarobin.
- Arbutin. See Resorcin; Hydroquinone.
- Arcus Senilis. See Cornea, Opacities of—Vascular System; Arteriosclerosis.
- Ardor Urinæ. See Colchicum—Urinary System, Surgical Diseases of; Gonorrhœa.
- Areca-nut. See Arecoline.
- ARECOLINE (*General Subject*).
- ARGENTAMINE (*General Subject*)—Silver; Unofficial Salts—Urinary System, Surgical Diseases of; Gonorrhœa.
- Argentum. See Silver.
- ARGONIN (*General Subject*). See Silver; Unofficial Salts—Urinary System, Surgical Diseases of; Gonorrhœa.
- Argyll-Robertson Pupil. See Insanity; General Paresis. Locomotor Ataxia.
- Argyria. See Silver; Poisoning; Chronic.
- Arrhythmia. See Vasculo-Cardiac Neuroses; Irregular Heart.
- Arrhythmia, Cardiac. See Fatty Heart.
- ARISTOL (*General Subject*). See Iodine.
- Arm, Cyanosis of. See Pseudoleukæmia.
- Arm, Neuralgic Pains of. See Tumors of Breast; Scirrhus Carcinoma.
- Arm, Edema of. See Mediastinum; Tumors—Pseudoleukæmia—Tumors of Breast; Scirrhus Carcinoma.
- Arm, Paralysis of. See Hysteria; Motor Symptoms—Wounds of Head; Wounds of Brain.
- Arms, Tingling Pains in. See Spasms in Children; Tetany.
- Arnica Eruption. See Dermatitis Venenata.
- Aromatic. See Chamomile—Cinnamon—Cubebs—Mace—Mentha.
- Arrack. See Alcohol.
- Arrested Growth. See Animal Extracts; Thyroid.
- ARSENIC (*General Subject*). See Bright's Disease; Acute—Hemoglobinuria—Malarial Fevers—Nursing; Breast-milk—Pseudoleukæmia.
- Arsenic Eruption. See Dermatitis Medicamentosa—Eruption, Arsenic (Index).
- Arsenic Poisoning. See Cholera Asiatica—Cholera Morbus—Fatty Heart—Hysteria—Iron—Magnesia.
- Arsenical Neuritis. See Nerves, Peripheral; Multiple Neuritis.
- Arsenicism. See Arsenic; Poisoning, Chronic.
- Arsenuretted Hydrogen, Poisoning by. See Jaundice, Toxæmia.
- Arterial Cirrhosis. See Cirrhosis of the Liver.
- Arterial Depressant. See Veratrum Viride; Physiological Action.
- Arterial Embolism. See Vascular System; Vascular Obstruction; Embolism.
- Arterial Hematoma. See Aneurism; Popliteal.
- Arterial Pulsation. See Aneurism.
- Arterial Sclerosis. See Arteriosclerosis (Index).
- Arterial Sedative. See Aconite.
- Arterial Thrombosis. See Vascular Diseases of Brain; Thrombosis—Vascular System; Vascular Obstruction; Thrombosis.
- Arteries, Contusions of. See Vascular System; Injuries of Arteries.
- Arteries, Disorders of. See Vascular System.
- Arteries, Injuries of. See Vascular System.
- Arteries, Ligation of. See Vascular System; Injuries of Arteries; Rupture.
- Arteries, Rupture of. See Vascular System; Injuries of Arteries; Contusion.
- Arteries, Spasm of. See Vascular System; Arteriosclerosis.
- Arteries, Throbbing of. See Neurasthenia.
- Arteries, Torsion of. See Vascular System; Injuries of Arteries; Rupture.
- Arteries, Wounds of. See Vascular System; Injuries of Arteries.
- Arterio-Capillary Fibrosis. See Vascular Diseases; Arteriosclerosis.
- Arteriofibrosis. See Vascular System; Arteriosclerosis.
- Arteriosclerosis. See Angina Pectoris—Bright's Disease; Chronic—Cerebral Hemorrhage—Cirrhosis of the Liver; Arterial—Diabetes Mellitus—Epilepsy; Cardiac—Ether; Contra-indications—Fatty Heart—Hypertrophy of the Heart—Meningitis; Leptomeningitis—Myocarditis—Specific Infectious Fevers; Terminal Infections—Strontium; Cardiac Disorders—Vascular Diseases—Vascular System; Arteries.
- Arterio-Venous Aneurism. See Aneurism.
- Arteritis. See Digitalis—Vascular System; Arteries.
- Arteritis, Thrombo-. See Vascular System; Arteritis.
- Arthralgia. See Mentha.
- Arthrectomy. See Joints; Arthritis.
- Arthritic Effusions. See Specific Infectious Fevers; Malta.
- Arthritic Hemoptysis. See Pulmonary Circulation; Hemorrhage.
- Arthritis. See Exalgin—Joints, Diseases of—Pneumonia, Lobar—Toxic Foods; Shell-fish Poisoning.
- Arthritis Deformans. See Guaiacol—Ichthyol—Joints; Loose Bodies in.
- Arthritis, Gelatinous. See Joints, Tubercular.
- Arthritis, Neuropathic. See Joints; Charcot's Disease.
- Arthritis, Pyæmic. See Scarlet Fever.
- Arthritis, Rheumatic. See Joints—Rheumatism; Acute.
- Arthritis, Rheumatoid. See Rheumatoid Arthritis (Index).
- Arthritis, Septic. See Joints; Septic Arthritis.
- Arthritis, Syphilitic. See Joints; Syphilitic Arthritis.
- Arthritis, Tubercular. See Joints.
- Arthritis Urica. See Gout.
- Arthritism. See Pulmonary Circulation; Hemorrhage.
- Arthropathies. See Nerves, Wounds and Injuries of—Spinal Cord; Syringomyelia.
- Arthropathies of Charcot. See Locomotor Ataxia.
- Arthropathy, Tabetic. See Joints; Charcot's Disease.
- Arthrotomy. See Fractures—Joints; Arthritis.
- Articular Fever, Eruptive. See Specific Infectious Fevers; Dengue.
- Articular Rheumatism. See Rheumatism—Silver; Unguentum Credé.
- Artificial Anus. See Anus, Artificial (Index).
- Artificial Feeding of Infants. See Nursing and Artificial Feeding.
- Artificial Respiration. See Chloroform—Ether—Pulmonary Circulation; Atelectasis.
- Artificial Respiration, Byrd's Method of. See Pulmonary Circulation; Atelectasis.

- Artificial Respiration, Dew's Method of. See Pulmonary Circulation; Atelectasis.
- Artificial Respiration, Laborde's Method of. See Laborde's Method of Artificial Respiration (Index).
- Artificial Vagina. See Vagina; Absence and Defects of Structure.
- Arytenoids, Clubbing of. See Tuberculosis of Larynx.
- Arytenoids, Pyriform Swelling of. See Tuberculosis of Larynx.
- Asafetida. See Catalepsy.
- ASAPROL (*General Subject*). See Naphthalin—Pertussis.
- Ascarides. See Naphthalin—Quassia—Thymol.
- Ascarides Vermiculares. See Iron.
- Ascaris Lumbricoides. See Parasites; Intestinal—Salicylic Acid.
- Ascending Paralysis, Acute. See Spinal Cord; Landry's Paralysis.
- Asch's Operation. See Nasal Cavities; Septum.
- Ascites. See Cirrhosis of the Liver; Portal—Cirrhosis of the Liver; Secondary—Colocynth—Dilatation of the Heart—Elaterium—Gold—Jaborandi—Jalap—Liver; Chronic Perihepatitis—Liver; Hydatid Cyst—Liver; Passive Congestion—Liver; Tumors—Liver and Gall-bladder; Cancer of Gall-bladder—Magnesia—Mercury—Pancreas; Tumors—Paraldehyde—Peritoneum; Chronic Peritonitis—Peritoneum; Tuberculous Peritonitis—Peritoneum; Tumors—Potassium; Diuretics—Potassium; Purgatives—Pseudoleukemia—Uterine Adnexa; Tumors of Ovaries—Vascular System; Vascular Obstruction; Thrombosis.
- ASEPTIC ACID (*General Subject*).
- Aseptic Fever. See Surgical Diseases; Primary Wound Fever.
- Aseptol. See Phenic (Carbolic) Acid.
- Asiatic Cholera. See Cholera Asiatica (Index).
- Asparagin. See Licorice.
- Aspergillus in Ear. See External Ear.
- Asphyxia. See Ammonia—Ether—Intubation—Laryngitis; Edema—Nitrobenzene; Poisoning—Nitrous Oxide—Esophagus; Foreign Bodies—Oxygen—Pulmonary Circulation; Congestion—Respiratory Organs; Abductor Paralysis—Respiratory Passages; Larynx—Toxic Foods; Shellfish Poisoning—Tracheo—Laryngeal Operations; Laryngo-Tracheotomy—Tracheo—Laryngeal Operations; Tracheotomy—Tuberculosis of Lungs; Chronic Ulcerative Phthisis—Tumors of Larynx and Lung; Fibroma of Larynx.
- Asphyxia of Newborn. See Pulmonary Circulation; Atelectasis.
- Aspidium. See Male Fern.
- Aspidosaniline. See Quebracho.
- Aspidosperma. See Quebracho.
- Aspidospermatine. See Quebracho.
- Aspiration. See Empyema—Fractures of Patella—Hydronephrosis—Liver; Hydatid Cyst—Pleurisy—Tumors of Larynx and Lungs; Sarcoma of Lungs.
- Aspiration, Cranial. See Hydrocephalus; Chronic.
- Aspiration, Injections after. See Boracic Acid.
- Aspiration of Chest. See Wounds and Injuries of Thorax; Operations.
- Aspiration of Liver. See Liver; Abscess.
- Astasia-Abasia. See Hysteria—Vascular Diseases of Brain; Thrombosis.
- Asthenia. See Alcohol—Syphilis; General Infection—Typhoid Fever.
- ASTHMA (*General Subject*). See Aconite—Adhatoda—Justicia—Antipyrine—Arsenic—Asaprol—Atropine—Belladonna—Bromides, Bromates, etc.—Camphor—Chloral—Coffee; Caffeine—Digitalis—Erythema Symptomaticum—Ether—Eucalyptus—Fatty Heart—Gout—Grindelia—Iodine—Ipecac—Lobelia—Menthol—Nitrites—Nitroglycerin—Oxalic Acid—Ozone—Paraldehyde—Pertussis—Petroleum—Physostigma—Potassium; Febrifuges—Pulmonary Empyema; Vesicular—Pyridin—Quebracho—Quinine—Resorcin—Sandal-wood—Sodium; Laryngological Disorders.
- Asthma, Cardiac. See Cardiac Asthma (Index).
- Asthma, Renal. See Bright's Disease; Chronic.
- Asthma, Spasmodic. See Zinc; Respiratory Disorders.
- Asthmatic Cigarette. See Belladonna.
- ASTIGMATISM (*General Subject*). See Atropine—Hyperopia—Myopia—Neurasthenia.
- Astragalus, Dislocations of. See Dislocations.
- Astringent. See Alcohol—Alum—Aluminium—Alumol—Argentamine—Bismuth—Calcium—Cinnamon—Copper—Guarana—Hamamelis—Ichthyol—Iodine and Derivatives—Iron—Jambul—Kino—Krameria—Lead—Nitric Acid—Pelletierine—Quebracho—Salicylic Acid; Aluminium Salicylate; Ammoniated—Salicylic Acid; Bismuth Salicylate—Salicylic Acid; Ferric Salicylate—Silver—Silver; Argentamine—Zinc; Physiological Action.
- Ataxia. See Hysteria—Locomotor Ataxia—Spinal Cord; Syringomyelia—Spine, Diseases of; Tumors—Tumors of Brain; Tumors of Corpora Quadrigemina—Tumors of Brain; Tumors of Corpus Callosum.
- Ataxia, Choreiform. See Spinal Cord; Hereditary Ataxia.
- Ataxia, Family. See Spinal Cord; Hereditary Ataxia.
- Ataxia, Friedreich's. See Chorea—Spinal Cord; Hereditary Ataxia.
- Ataxia, Hereditary. See Spinal Cord, Diseases of.
- Ataxia, Locomotor. See Locomotor Ataxia (Index).
- Ataxia, Progressive Spastic. See Spinal Cord; Ataxic Paraplegia—Spinal Cord; Primary Lateral Sclerosis.
- Ataxic Movements. See Strychnine; Nervous Disorders.
- Ataxic Nervous Troubles. See Sulphonal; Poisoning.
- Ataxic Paraplegia. See Locomotor Ataxia—Spinal Cord, Diseases of—Spinal Cord; Primary Lateral Sclerosis.
- Atelectasis. See Pertussis.
- Atelectasis, Pulmonary. See Pulmonary Atelectasis.
- Atheroma. See Aneurism—Digitalis—Fatty Heart—Nerves; Peripheral; Anæmia—Phosphorus—Vascular System; Arteriosclerosis.
- Atheroma, Arterial. See Erythroxylon Coca.
- Atheroma of Aorta. See Hypertrophy of Heart—Myocarditis.
- Atheromatous Degeneration. See Pulmonary Circulation; Hemorrhage.
- Athetoid Movements. See Tumors of Brain; Tumors of Great Ganglia.
- ATHETOSIS (*General Subject*). See Hyoscyamus—Spasms in Children; Automatic Movements—Spasms in Children; Hysteria.
- Athletes. See Dilatation of the Heart.
- Atonic Dyspepsia. See Dyspepsia, Atonic (Index).
- Atony, Functional Nervous. See Strychnine; Nervous Disorders.
- Atony, Gastric. See Gastric Atony (Index).
- Atony of Intestines. See Intestines, Atony of (Index).
- Atony, Rectal. See Magnesia; Rectal Disorders.
- Atresia of Vagina. See Vagina, Atresia of (Index).
- Atrophic Empyema. See Pulmonary Empyema.
- Atrophic Gastritis. See Stomach, Diseases of; Chronic Gastritis.
- Atrophic Pharyngitis. See Tonsils; Atrophic Pharyngitis.
- Atrophic Rhinitis. See Rhinitis, Atrophic (Index).
- Atrophy, Acute Yellow. See Acute Yellow Atrophy (Index).
- Atrophy, Muscular. See Muscular Atrophy (Index).
- Atrophy of Bones of Skull. See Wounds of Head; Diseases Involving Skull.
- Atrophy of Leg-muscles. See Hip-joint Disease.
- Atrophy of Optic Nerve. See Optic Nerve, Atrophy of (Index).
- Atrophy of Spleen. See Spleen, Atrophy of (Index).
- Atrophy of Testicles. See Testicles, Atrophy of (Index).
- Atrophy of Thyroid Gland. See Myxœdema.
- Atrophy of Vagina. See Vagina.
- Atrophy of Vulva. See Vagina; Vulva.
- Atrophy, Optic. See Optic Atrophy (Index).
- Atrophy, Progressive Muscular. See Progressive Muscular Atrophy (Index).
- ATROPINE (*General Subject*). See Alkaloids—Belladonna—Homatropine—Hyoscyamus—Iritis—Keratitis—Nursing; Breast-milk.
- Atropine Mydriasis. See Physostigma; Ophthalmic Disorders.
- Atropine Poisoning. See Jaborandi—Physostigma.

- Atropine Rhinitis. See Nasal Cavities; Acute Rhinitis.
- Aubergier's Syrup. See Lactucarium.
- Aura. See Epilepsy—Hysteria.
- Aural Catarrh. See Tonsils; Hypertrophy.
- Aural Disease. See Meningitis; Leptomeningitis.
- Aural Polyp. See Middle Ear—Tumors; Connective Tissue.
- Auri et Sodii Chloridi. See Gold.
- Autografts. See Skin-grafting.
- Automatic Movements in Children. See Spasms in Children.
- Autonomous Neoplasms. See Tumors.
- Autozone. See Oxygen.
- Autumnal Fever. See Malarial Fevers.
- Autumnal Tertian Fever. See Malarial Fevers.
- Avena Sativa. See Neurasthenia.
- Avenolitis. See Obstruction, Intestinal.
- Awl-tail. See Parasites; Intestinal; Oxyuris.
- Axillæ, Hyperidrosis of. See Sodium; Cutaneous Disorder.
- Axillary Abscess. See Wounds and Injuries of Thorax; Secondary Complications.
- Axillary Aneurism. See Aneurism.
- Baccelli's Infection Method. See Liver; Hydatid Cyst.
- Baccelli's Sign. See Pleurisy; Acute.
- Bacillary Diphtheria. See Diphtheria.
- Bacilli, Typhoid. See Typhoid Fever.
- Bacillus, Abel's. See Nasal Cavities; Atrophic Rhinitis.
- Bacillus Anthracis. See Anthrax.
- Bacillus Charbon. See Hydrogen Dioxide.
- Bacillus Coli Communis. See Appendicitis.
- Bacillus, Friedländer's. See Friedländer's Bacillus (Index).
- Bacillus, Furuncle. See Blepharitis; Ciliaris.
- Bacillus Icteroides of Sanarelli. See Yellow Fever.
- Bacillus, Kitasato. See Plague.
- Bacillus, Klebs-Loeffler. See Klebs-Loeffler Bacillus (Index).
- Bacillus Lepræ. See Leprosy.
- Bacillus Mallei. See Glanders.
- Bacillus of Eberth. See Typhoid Fever.
- Bacillus of Koch. See Tuberculosis of Lungs.
- Bacillus of Lustgärten. See Syphilis; Bacillus.
- Bacillus, Oppler-Boas. See Oppler-Boas Bacillus (Index).
- Bacillus, Pfeiffer. See Influenza—Pfeiffer's Bacillus (Index).
- Bacillus, Plague. See Plague.
- Bacillus Pneumoniæ of Friedländer. See Pneumonia; Catarrhal.
- Bacillus, Tetanic. See Tetanus.
- Bacillus, Tubercle. See Tubercle Bacillus (Index).
- Bacillus, Typhoid. See Typhoid Fever.
- Bacillus Typhosus. See Typhoid Fever.
- Bacillus Virgula. See Cholera Asiatica.
- Bacillus "X" of Sternberg. See Yellow Fever.
- Backache. See Syphilis; General Infection—Uterus; Antelexion—Uterus; Prolapse—Uterus; Retroflexion.
- Bactericidal. See Potassium; Sozoiodolate—Silver; Silver and Potassium Cyanide.
- Bacterium Coli Commune. See Cystitis.
- Bad-Nauheim. See Vascular System; Arteriosclerosis.
- Bakers Itch. See Eczema.
- Baking-soda. See Sodium.
- Balanitis. See Europhen—Penis and Testicles; Inflammatory Affections.
- Balanoposthitis. See Penis and Testicles; Inflammatory Affections—Penis and Testicles; Phimosis.
- Baldness. See Alopecia (Index).
- Balloon-sickness. See Mountain-sickness.
- Balm-of-Gilead Fir. See Turpentine.
- Balsam, Canada. See Turpentine.
- Balsam Copaiba. See Copaiba.
- Balsam of Fir. See Turpentine.
- Balsamum Traumaticum. See Benzoic Acid.
- Band-box Tone of Biermer. See Pulmonary Emphysema; Vesicular.
- Band-shaped Stools. See Intestines; Tumors.
- Bandage, Esmarch's. See Esmarch's Bandage (Index).
- Bandage, Plaster-of-Paris. See Orthopædic Surgery.
- Bantingism. See Fatty Heart.
- Banting's System of Dietary. See Fatty Heart.
- Barbadoes Tar. See Petroleum.
- BARIUM (*General Subject*).
- Barley. See Malt.
- Barlow's Disease. See Scorbutus, Infantile.
- Bar-reading. See Strabismus.
- Barrel-chest. See Asthma—Pulmonary Emphysema; Vesicular.
- Barrel-shaped Thorax. See Tumors of Larynx and Lungs; Sarcoma of Lungs.
- Bartholinian Abscess. See Hernia; Perineal.
- Barton's Fracture. See Fractures of Radius.
- Basedow's Disease. See Exophthalmic Goitre (Index).
- Basham's Mixture. See Iron.
- Basilar Meningitis. See Meningitis.
- Basiotripsy. See Parturition, Abnormal.
- Bassini's Operation for Hernia. See Hernia; Femoral—Hernia; Inguinal.
- Baths, Bran. See Miliaria.
- Baths, Hot. See Meningitis; Leptomeningitis.
- Baths, Hot Air. See Hot-Air Baths (Index).
- Baths, Hot Water. See Bright's Disease.
- Baths, Nauheim. See Vascular System; Arteriosclerosis.
- Baths, Spring-water. See Gout.
- Battery-fluid. See Potassium; Caustics.
- Bazin's Disease. See Erythema Scrofulosorum.
- Bean of St. Ignatius. See Nux Vomica.
- Bechterew's Method. See Epilepsy.
- Bed-bug Bite. See Dermatitis Venenata—Wounds and Stings.
- Bed-sores. See Benzoin—Chloral—Creasote—Dermatitis Gangrenosa—Hydrogen Dioxide—Insanity—Locomotor Ataxia—Meningitis; Spinal—Salicylic Acid; Poisoning—Silver; Surgical Disorders—Spinal Cord; Myelitis—Spine, Diseases of—Typhoid Fever—Wounds (Septic); Pressure Gangrene.
- Bednar's Aphthæ. See Mouth and Lips, Diseases of.
- Beech-wood Creasote. See Creasote.
- Beef Poisoning. See Toxic Foods; Meat Poisoning.
- Beef Tape-worm. See Parasites, Tape-worms; Tænia Mediocanellata.
- Beer. See Alcohol—Alcoholism—Malt.
- Beer-drinking. See Glycosuria.
- Bee-stings. See Dermatitis Venenata—Ipecac—Wounds and Stings.
- Belching, Nervous. See Stomach, Diseases of; Functional; Motor Neuroses.
- BELLADONNA (*General Subject*). See Atropine—Toxic Foods; Grain Poisoning.
- Belladonna Eruption. See Dermatitis Medicamentosa—Erythema Scarlatiniforme.
- Belladonna Poisoning. See Alcoholism—Coffee.
- Belladonnine. See Belladonna.
- Bell-sound. See Pleura; Pneumothorax.
- Bell's Palsy. See Herpes Zoster—Nerves, Peripheral; Facial Paralysis.
- Bell's Paralysis. See Nerves, Peripheral; Simple Neuritis.
- Benign Growths of Fallopian Tubes. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Benign Growths of Rectum. See Tumors of Rectum and Anus; Malignant Growths.
- Benign Neoplasms of Vagina. See Vagina; Non-cystic Growths.
- Benign Tumors. See Tumors.
- Benignant Anthrax. See Surgical Diseases of the Skin and its Appendages; Carbuncle.
- BENZANILID (*General Subject*).
- Benzin. See Petroleum.
- Benzoate-of-Sodium Eruption. See Dermatitis Medicamentosa.
- Benzoates. See Benzoic Acid.
- BENZOIC ACID (*General Subject*). See Naphthalin; Benzonaphthol.
- BENZOIN (*General Subject*). See Benzoic Acid.
- Benzoinated Lard. See Benzoin.
- Benzonaphthol. See Naphthalin—Naphthol.
- Benzosal. See Creasote.
- Benzosol. See Guaiacol.
- Benzoyl-guaiacol. See Creasote—Guaiacol.
- Benzoyl-naphthol. See Naphthalin.
- BERIBERI (*General Subject*). See Nerves, Peripheral; Multiple Neuritis.
- Berberine. See Hydrastis.
- Besnier, Trichomania of. See Alopecia.
- Besnier's Voix Lépreuse. See Leprosy.
- Beta-iso-amylene. See Pental.

- Betanaphthol. See Bright's Disease; Acute Nephritis—Naphthol—Naphthalin.
- Betanaphthol, Camphorated. See Naphthalin.
- Betanaphthol-salicylate. See Naphthalin; Salinaphthol.
- Bête Rouge. See Wounds and Stings; Diablotto Colorado.
- Betel-nut. See Arecoline.
- Betol. See Naphthalin; Salinaphthol—Salicylic Acid; Naphthol Salicylate.
- Bezold's Mastoiditis. See Middle Ear; Mastoiditis.
- Bhang. See Cannabis Indica.
- Bicarbonate of Soda. See Cystitis.
- Bicycle-riding. See Albuminuria—Dilatation of the Heart—Laryngitis; Acute—Muscles; Traumatic Myalgia—Nerves, Peripheral; Simple Neuritis.
- Biermer's Band-box Tone. See Pulmonary Emphysema; Vesicular.
- Bigeminal Pulse. See Dilatation of the Heart.
- "Big Jaw." See Actinomycosis.
- Bile in Stools. See Jaundice; Toxæmia.
- Bile in Urine. See Urine, Bile in (Index).
- Bile-ducts, Cancer of. See Liver; Tumors of Biliary Tract.
- Bile-ducts, Carcinoma of. See Liver; Tumors of Biliary Tract.
- Bile-passages, Inflammation of. See Liver.
- Bile-pigment in Urine. See Urine, Bile-pigment in (Index).
- Bile-stained Stools. See Malarial Fevers; Pernicious.
- Bile-stained Vomit. See Malarial Fevers; Pernicious.
- Bile-stones. See Cholelithiasis—Gall-stones (Index).
- Bilharzia Hæmatobia. See Hæmaturia.
- Biliary Calculi. See Cholelithiasis.
- Biliary Cirrhosis. See Cirrhosis of the Liver.
- Biliary Colic. See Chloroform—Cholelithiasis—Intestines; Duodenum, Ulceration—Nitroglycerin—Pancreas; Acute Pancreatitis—Sulphur; Gastro-Intestinal Diseases.
- Biliary Ducts, Lesions of. See Abdomen; Contusions.
- Biliary Passages, Diseases of. See Mercury.
- Biliary Tract, Carcinoma of. See Liver; Tumors of Biliary Tract.
- Biliary Tract, Tumors of. See Liver and Gall-bladder.
- Bilifuscin. See Choluria.
- Bilious Colic. See Colocynth.
- Bilious Fever. See Quinine.
- Bilious Headache. See Neuralgia; Migraine.
- Bilious Pneumonia. See Pneumonia, Lobar.
- Bilious Remittent Fever. See Malarial Fevers—Yellow Fever.
- Biliousness. See Mercury.
- Bilirubin. See Choluria.
- Bilirubin, Ehrlich's Test for. See Choluria.
- Biesiadecki-Löwit Theory. See Leukæmia.
- Birth-palsies. See Spinal Cord; Poliomyelitis.
- BISMUTH (General Subject). See Iodine; Aiol.
- Bismuth Enteroliths. See Obstruction, Intestinal.
- "Bismuth" Stools. See Yellow Fever.
- Bismuth Subnitrate. See Stomach, Diseases of; Gastric Ulcer.
- Bites, Flea-. See Flea-bites (Index).
- Bites, Insect-. See Insect-bites (Index).
- Bites, Mosquito-. See Mosquito-bites (Index).
- Bites, Snake-. See Snake-bites (Index).
- Bites, Venomous. See Coffee.
- Bitter Apple. See Colocynth.
- Bitter Cucumber. See Colocynth.
- Black Cohosh. See Cimicifuga.
- Black Death. See Plague.
- Black Drop. See Opium.
- "Black Eye." See Palpebræ; Injuries.
- Black Jaundice. See Jaundice; Obstruction.
- Black Snake-root. See Cimicifuga.
- Black Tongue. See Boracic Acid; Sodium Biborate.
- Black Urine. See Pix Liquida; Poisoning.
- Black Vomit. See Yellow Fever.
- Black Wash. See Mercury.
- BLACK-WATER FEVER (General Subject). See Malarial Fevers.
- Bladder. See Cystitis (Index).
- Bladder, Atony of. See Penis and Testicles; Phimosis—Physo stigma.
- Bladder, Blood-clots in. See Pepsin.
- Bladder, Catarrh of. See Hydrastis.
- Bladder, Chronic Inflammation of. See Cubeb.
- Bladder, Diseases of. See Rectum and Anus; Irritable Ulcer—Urinary System, Surgical Diseases of.
- Bladder, Distended. See Peritoneum; Ascites—Uterine Adnexa; Tumors of Ovaries.
- Bladder, Exstrophy of. See Urinary System, Diseases of (Surgical); Ureteral Implantation—Urinary System, Surgical Diseases of; Injuries of Bladder.
- Bladder, Full. See Parturition, Abnormal.
- Bladder, Hemorrhage from. See Hæmaturia—Pancreatin—Scorbutus.
- Bladder, Hernia of. See Vagina; Herniæ.
- Bladder, Inflammation of. See Cystitis—Potassium Chlorate.
- Bladder, Injury of. See Abdomen; Contusion—Abdomen; Penetrating Wounds—Urinary System, Surgical Diseases of.
- Bladder, Irrigation of. See Formaldehyde.
- Bladder, Irritable. See Colchicum—Lupulus.
- Bladder, Irritation of. See Piperazin.
- Bladder, Malignant Growths of. See Urinary System, Diseases of (Surgical); Renal Calculus.
- Bladder, Operations upon. See Erythroxylon Coca.
- Bladder, Paralysis of. See Creasote—Insanity; General Paresis—Malarial Fevers—Spine, Diseases of; Bed-sores—Wounds of Head; Compression of Brain.
- Bladder, Paresis of. See Meningitis; Acute Spinal Leptomeningitis—Meningitis; Spinal.
- Bladder, Rupture of. See Abdomen—Fractures of Pelvis—Urinary System, Surgical Diseases of.
- Bladder, Spasm of. See Cannabis Indica—Cystitis.
- Bladder, Stone of. See Urinary System, Diseases of (Surgical); Renal Calculus.
- Bladder, Tumors of. See Urinary System, Surgical Diseases of; Hypertrophy of Prostate.
- Bladder, Urinary. See Vesical (Index).
- Bladder, Villous Growths of. See Urinary System, Diseases of (Surgical); Renal Calculus.
- Bladder-worm. See Liver; Hydatid Cyst.
- Bladder-worm Disease. See Parasites; Echinococcal Disease.
- Blebs. See Erysipelas—Pemphigus.
- Bleeder's Disease. See Hæmophilia.
- Bleeding Hemorrhoids. See Hemorrhoids, Bleeding (Index).
- Bleeding of Gums. See Gums, Bleeding (Index).
- Biennorrhagia, Acute. See Alumol.
- Blennorrhœa. See Conjunctiva; Granular Conjunctivitis—Creasote—Silver; Largin.
- Blepharadenitis. See Blepharitis.
- BLEPHARITIS (General Subject). See Aristol—Ichthyol—Mercury; Oxides.
- Blepharophimosis. See Palpebræ; Acquired Anomalies.
- Blepharospasm. See Belladonna—Conjunctiva; Phlyctenular Conjunctivitis—Palpebræ; Neuroses.
- Blindness. See Amaurosis (Index)—Belladonna—Hysteria—Optic Nerve and Retina—Uræmia—Wounds of Head; Wounds of Brain.
- Blindness, Mind-. See Tumors of Brain; Tumors of Occipital Lobe.
- Blindness, Night-. See Optic Nerve and Retina; Retinitis.
- Blindness, Quinine. See Optic Nerve; Optic Atrophy.
- Blindness, Word-. See Word-blindness (Index).
- Blister. See Adenitis—Chloral—Lead.
- Blister, Flying. See Cantharides.
- Blister-beetle. See Cantharides.
- Blister-plaster. See Cantharides.
- Blistering Collodion. See Cantharides.
- Blistering-paper. See Cantharides.
- Blocking of Cavernous Sinus. See Vascular Diseases of Brain; Thrombosis of Sinuses.
- Blood, Diabetic. See Diabetes Mellitus.
- Blood Disorders. See Amenorrhœa—Animal Extracts; Splenic.
- Blood, Expectoration of. See Laryngitis; Acute.
- Blood, Extravasation of. See Vascular System; Vascular Obstruction; Embolism.
- Blood in Urine. See Urine, Blood in (Index).
- Blood Poisoning. See Silver; Unguentum Crêdè.
- Blood-fluke. See Parasites; Distoma Hæmatobium.
- Blood-letting. See Bright's Disease; Acute—Venesection (Index).
- Blood-stained Sputum. See Sputum, Blood-stained (Index).

- Blood-tinged Expectoration. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
- Blood-vessels in Alcoholism. See Alcoholism.
- Blood-vessels, Injuries of. See Vascular System; Injuries to Blood-vessels.
- Blood-vessels, Tumors of. See Tumors; Connective Tissue.
- Bloody Diarrhea. See Stomach, Surgery of; Intestines; Thrombosis.
- Bloody Gums. See Yellow Fever.
- Bloody Stools. See Stools, Bloody (Index).
- Bloody Urine. See Urine, Blood in (Index).
- Bloody Vomiting. See Hæmatemesis (Index)—Vomiting, Bloody (Index).
- "Blue Baby." See Pulmonary Circulation; Atelectasis.
- Blue-Gum Tree. See Eucalyptus.
- Blue Mass. See Mercury; Metallic.
- Blue Ointment. See Mercury; Metallic.
- "Blue Pill." See Mercury; Metallic.
- Blue Vitriol. See Copper.
- Blushing. See Erythema Simplex.
- Boat-shaped Deformity of Thorax. See Spinal Cord; Syringomyelia.
- Body, Enlargement of. See Myxœdema.
- Boiler-maker's Deafness. See Internal Ear; Occupation Deafness.
- Boils. See Aiol—Blepharitis—Camphor; Phenicated—Chloral—Cotton-plant—Dermatitis Exfoliativa—Dermatitis Medicamentosa—Euophen—Furuncle (Index)—Furunculosis (Index)—Ichthyol—Jaundice; Obstructive—Linum—Mercury; Chlorides—Mercury; Nitrates—Phenic (Carbolic) Acid—Phosphorus—Potassium; Caustics—Silver; Surgical Disorders—Specific Infectious Fevers; Dengue—Sulphur; Cutaneous Disorders—Surgical Diseases of the Skin and its Appendages; Furuncle—Typhoid Fever.
- Bone, Caries of. See Osseous System; Bone Tuberculosis.
- Bone, Diseases of. See Osseous System.
- Bone, Hypertrophy of. See Acromegaly.
- Bone, Inflammation of. See Typhoid Fever.
- Bone, Necrosis of. See Osseous System; Osteomyelitis—Scorbutus.
- Bone Suppuration. See Urinary System, Diseases of; Amyloid Kidney.
- Bone, Transplantation of. See Osseous System; Osteomyelitis.
- Bone Tuberculosis. See Tuberculosis, Bone (Index).
- Bone-cavities. See Salol.
- Bone-flap. See Wounds of Head; Technique of Intracranial Surgery.
- Bone-marrow. See Animal Extracts.
- Bone-marrow, Changes in. See Anæmia, Pernicious.
- Bone-marrow, Hyperplasia of Lymphoid. See Status Lymphaticus.
- Bone-marrow Therapy. See Pseudoleukæmia.
- Bone-oil. See Pyridin.
- Bone-pains. See Syphilis; General Infection.
- Bones, Brittleness of. See Osseous System; Fragilitas Ossium.
- Bones, Decalcification of. See Picric Acid.
- Bones, Diseases of. See Strontium; Constitutional Disorders.
- Bones, Softening of. See Osseous System; Osteomalacia.
- Bonjean's Ergotine. See Ergot.
- BORACIC ACID (*General Subject*).
- Boral. See Aluminium.
- Borax. See Boracic Acid.
- Boric Acid. See Boracic Acid.
- Boro-borax. See Boracic Acid.
- Borosaliyl. See Salicylic Acid; Sodium Borosaliylate.
- Borosaliylic Acid. See Salicylic Acid.
- Botrioccephalus Latus. See Parasites, Intestinal; Tape-worms.
- Böttiger's Test. See Diabetes Mellitus.
- Bottini's Operation. See Urinary System, Surgical Diseases of; Hypertrophy of Prostate.
- Bougies, Lubricant for. See Petroleum.
- Bouquet Fever. See Specific Infectious Fevers; Dengue.
- Bourboule Water. See Diabetes Mellitus.
- Bowel, Irrigation of. See Colic, Irrigation of (Index)—Dysentery.
- Bowel, Prolapse of. See Infants, Diarrhœal Diseases of; Ileocolitis—Tumors of Rectum and Anus; Benign.
- Bowel-feeding. See Stomach, Diseases of; Gastric Ulcer.
- Bowels, Hæmorrhage from. See Typhoid Fever—Variola.
- Bow-legs. See Orthopædic Surgery.
- Bowman's Operation. See Lacrymal Apparatus; Stricture.
- Boxberry. See Gaultheria.
- Brachial Aneurism. See Aneurism.
- Brachycardia. See Vasculo-Cardiac Neuroses; Slow Heart.
- Bradford's Frame. See Hip-joint Disease.
- Bradycardia. See Vasculo-Cardiac Neuroses; Slow Heart.
- Brain. See Cerebral (Index).
- Brain, Abscess of. See Cerebral Abscess (Index)—Encephalic Abscess (Index)—Encephalitis; Suppurative—Insanity; Cerebral Tumors—Optic Nerve and Retina; Optic Neuritis—Tumors of Brain—Wounds (Septic) and Gangrene; Pyæmia.
- Brain, Actinomycosis of. See Actinomycosis.
- Brain, Air-embolism of. See Vascular Diseases of Brain; Embolism.
- Brain, Chronic Abscess of. See Tumors of Brain.
- Brain, Cold Abscess of. See Encephalitis; Suppurative—Encephalitis; Acute Suppurative.
- Brain, Compression of. See Wounds of Head; Diseases Involving Skull—Wounds of Head; Wounds of Brain.
- Brain, Concussion of. See Concussion of Brain (Index).
- Brain, Cortical Lesions of. See Hysteria.
- Brain, Diseases of. See Deaf-mutism.
- Brain, Dropsy of the. See Hydrocephalus.
- Brain, Embolism of. See Vascular Diseases of Brain; Embolism.
- Brain Extract. See Animal Extracts.
- Brain, Fat-embolism of. See Vascular Diseases of Brain; Embolism.
- Brain, Foreign Bodies in. See Wounds of Head; Foreign Bodies in Brain.
- Brain, Gummy Tumors in. See Syphilis; Period of Sequelæ.
- Brain, Hæmorrhage of. See Vascular Diseases of Brain; Embolism.
- Brain, Hypertrophy of. See Hydrocephalus. Chronic.
- Brain, Infarctions in. See Valvular Diseases of Brain; Acute Endocarditis.
- Brain, Inflammation of. See Encephalitis—Salicylic Acid; Contra-indications.
- Brain, Lesions of. See Catalepsy.
- Brain, Mycosis of. See Encephalitis; Acute Non-suppurative.
- Brain, Oedema of. See Magnesia.
- Brain, Organic Diseases of. See Optic Nerve and Retina; Retinitis.
- Brain, Pathology of, in Alcoholism. See Alcoholism; Chronic.
- Brain, Sclerosis of. See Sclerosis of Brain.
- Brain, Septic Embolism of. See Vascular Diseases of Brain; Embolism.
- Brain, Syphilis of. See Sclerosis of Brain.
- Brain, Thrombosis of. See Vascular Diseases of Brain; Thrombosis of Sinuses.
- Brain, Tumors of. See Encephalitis; Chronic—Insanity—Locomotor Ataxia—Meningitis; Leptomenigitis—Optic Nerve and Retina; Optic Neuritis—Sclerosis of Brain—Tumors of the Brain—Wounds of Head; Technique of Intracranial Surgery.
- Brain, Tumors of Base of. See Tumors of Brain.
- Brain, Vascular Diseases of. See Vascular Diseases of Brain.
- Brain, Water on the. See Hydrocephalus.
- Brain, Wounds of. See Wounds of Head; Diseases Involving Skull.
- Brain, Wounds of Sinuses of. See Wounds of Head; Wounds of Sinuses of Brain.
- Brain-veins, Thrombosis of. See Vascular Diseases of Brain; Thrombosis of Brain-veins.
- Bran-bath. See Millaria.
- Brandy. See Alcohol.
- Bradford's Operation. See Aneurism.
- Bread Poisoning, Cornmeal. See Toxic Foods; Grain Poisoning.
- Break-bone Fever. See Specific Infectious Fevers; Dengue.
- Breast. See Mammary Gland (Index).
- Breast, Adenofibroma of. See Tumors of Breast.

- Breast, Atrophy of. See Iodine; Iodism.
 Breast, Cancer of. See Cancer of Breast (Index).
 Breast, Carcinoma of. See Cancer of Breast (Index).
 Breast, Congestion of. See Atropine.
 Breast, Cysts of. See Tumors of Breast.
 Breast, Encephaloid Cancer of. See Tumors of Breast; Cancer—Tumors of Breast; Encephaloid.
 Breast, Hæmorrhages from. See Hæmorrhage from Breast (Index).
 Breast, Halsted's Operation for Cancer of. See Tumors of Breast.
 Breast, Hypertrophy of. See Tumors of Breast.
 Breast, Inflammation of. See Parotitis; Infectious.
 Breast, Malignant Disease of. See Nursing and Artificial Feeding; Nursing.
 Breast, Pigeon. See Pigeon Breast (Index).
 Breast, Removal of. See Tumors of Breast.
 Breast, Sarcoma of. See Tumors of Breast.
 Breast, Scirrhus Cancer of. See Tumors of Breast; Cancer.
 Breast, Swollen. See Belladonna.
 Breast Tuberculosis of. See Tumors of Breast; Tuberculosis.
 Breast, Tumors of. See Tumors of Breast.
 Breast, Ulceration of. See Tumors of Breast; Encephaloid—Tumors of Breast; Scirrhus Carcinoma.
 Breast-milk. See Nursing and Artificial Feeding.
 Breast-pang. See Angina Pectoris.
 Breath, Offensive. See Phenic (Carbolic) Acid.
 Breath, Sulphurous. See Sulphur; Poisoning.
 Breathing, Amphoric. See Tuberculosis of Lungs.
 Breathing, Bronchial. See Tuberculosis of Lungs.
 Breathing, Stertorous. See Uræmia.
 Breathing, Tubular. See Tuberculosis of Lungs.
 Breech, Cranioclast to. See Parturition; Abnormal.
 "Brick-makers' Anæmia." See Parasites; Intestinal; Anchylostoma.
 BRIGHT'S DISEASE (*General Subject*). See Benzoic Acid—Cannabis Indica—Chlorosis—Colocynth—Diabetes Insipidus—Digitalis—Erythema Multiforme—Erythema Symptomaticum—Fatty Heart—Insanity—Uræmic—Iron—Jaborandi—Juniper—Mercury; Chlorides—Nephritis (Index)—Nerves—Peripheral; Multiple Neuritis—Nitroglycerin—Optic Nerve and Retina; Retinitis—Pleurisy; Acute—Potassium; Diuretics—Pulmonary Circulation; Œdema—Salicylic Acid; Contra-indications—Strophanthus—Uræmia—Urinary System, Diseases of; Amyloid Kidney.
 Bright's Disease, Chronic. See Strontium; Genito-Urinary Disorders.
 Brimstone. See Sulphur.
 Brisement Forcé. See Fractures.
 Brittleness of Nails. See Sulphur; Cutaneous Disorders.
 Broad Ligament, Cysts of. See Uterine Adnexa; Tumors of Ovaries.
 Broad Ligament, Hæmatocele into. See Uterine Adnexa; Tumors of Ovaries.
 Bromal. See Bromides.
 Bromalhydrate. See Bromides.
 Bromalin. See Bromides.
 Bromamide. See Bromides.
 Bromates. See Bromine and its Derivatives.
 Bromelin. See Bromides.
 Bromethylformamide. See Bromides.
 Bromide. See Bromine and its Derivatives.
 BROMIDE OF ETHYL (*General Subject*). See Ether.
 Bromides. See Epilepsy—Morphinomania.
 Bromidrosis. See Aristol—Chloral—Jaborandi.
 BROMINE AND ITS DERIVATIVES (*General Subject*).
 Brominism. See Bromides, Bromates, etc.
 Bromism. See Bromides, Bromates, etc.
 Bromochloral. See Chloral.
 Bromoform. See Bromides—Pertussis.
 Bromohydrate of Caffeine. See Bromides.
 Bromohydrate of Conine. See Bromides.
 Bromohydrate of Quinine. See Bromides.
 Bromohydrate of Scopolamine. See Bromides.
 Bromohydrate of Strychnine. See Bromides.
 Bromohydric Acid. See Bromides.
 Bromol. See Bromides—Phenic (Carbolic) Acid.
 Bromomania. See Bromides.
 Bromphenol. See Phenic (Carbolic) Acid.
 Bronchi: Foreign Bodies in. See Wounds and Injuries of Thorax; Posterior Thoracotomy.
 Bronchial Affections. See Thymol.
 Bronchial Asthma. See Asthma.
 Bronchial Breathing. See Tuberculosis of Lungs.
 Bronchial Catarrh. See Licorice—Phosphoric Acid.
 Bronchial Catarrhs of Aged. See Turpentine.
 Bronchial Cough. See Lobelia.
 Bronchial Disorders, Chronic. See Petroleum.
 Bronchial Fluke. See Parasites; Distoma Pulmonale.
 Bronchial Glands, Enlarged. See Glands, Enlarged.
 Bronchial (Index)—Hydrocephalus; Acute—Pertussis.
 Bronchial Irritation. See Tumors of Larynx and Lungs; Carcinoma of Lungs.
 Bronchial Spasms. See Asthma.
 Bronchial Stenosis. See Leukæmia.
 BRONCHIECTASIS (*General Subject*). See Creasote.
 Bronchiectatic Cavities of Lung. See Wounds and Injuries of Thorax; Pneumotomy.
 Bronchiolectasis. See Bronchiectasis.
 Bronchitic Actinomycosis. See Actinomycosis.
 BRONCHITIS (*General Subject*). See Aconite—Ammonium; Carbonate—Ammonium; Chloride—Apomorphine—Asthma—Belladonna—Chloral—Coffee; Caffeine—Creasote—Cubeb—Erysipelas—Ether—Eucalyptus—Fatty Heart—Gout—Grindelia—Infants, Diarrheal Diseases of—Influenza—Iodine—Ipecac—Jaborandi—Linum—Mustard—Naphthalin—Nitric Acid—Nitrites—Opium; Apocodine—Oxalic Acid—Oxygen—Ozone—Pertussis—Phenic (Carbolic) Acid; Chlorphenol—Pix Liquida—Pneumonia, Catarrhal—Pneumonokonioid—Potassium; Antacids—Pulmonary Emphysema; Vesicular—Potassium; Anti-emetics—Salicylic Acid; Ammonium Salicylate—Salol—Sandal-wood—Sodium; Laryngological Disorders—Spine, Diseases of; Tuberculosis—Tuberculosis of Lungs; Chronic Ulcerative Phthisis—Turpentine—Typhoid Fever—Valvular Diseases of Heart; Aortic Regurgitation—Valvular Diseases of Heart; Mitral Stenosis—Wounds and Injuries of Thorax; Mural Injuries—Wounds and Injuries of Thorax; Rupture of Lung—Wounds and Injuries of Thorax; Secondary Complications.
 Bronchitis, Capillary. See Pneumonia, Catarrhal.
 Bronchitis, Catarrhal. See Bronchitis; Fibrinous.
 Bronchitis, Chronic. See Sulphur; Respiratory Disorders.
 Bronchitis, Fætid. See Fætid Bronchitis (Index).
 Bronchitis, Putrid. See Pulmonary Abscess and Gangrene.
 Broncho-alveolar Catarrh. See Pneumonia, Catarrhal.
 Broncho-alveolitis. See Pneumonia, Catarrhal.
 Bronchocele. See Goitre.
 Broncho-pneumonia. See Creasote—Infants, Diarrheal Diseases of—Measles—Paraldehyde—Pertussis—Pneumonia, Catarrhal—Pneumonia, Lobar—Pulmonary Circulation; Œdema—Quinine—Typhoid Fever; Complications—Wounds and Injuries of Thorax; Rupture of Lung.
 Broncho-pneumonia, Tuberculous. See Pneumonia, Catarrhal.
 Broncho-pulmonary Hæmorrhage. See Pulmonary Circulation.
 Bronchorrhagia. See Pulmonary Circulation; Hæmorrhage.
 Bronchorrhæa. See Bronchitis; Acute—Creasote—Eucalyptus—Nux Vomica—Phenic (Carbolic) Acid; Chlorphenol—Pix Liquida—Quinine—Strychnine; Pulmonary Disorders—Turpentine.
 Bronzed Diabetes. See Cirrhosis of the Liver; Portal.
 Bronzed Skin Disease. See Addison's Disease.
 Bronzing of Skin. See Pseudoleukæmia—Suprarenal Capsules; Tumors.
 Brow-ague. See Neuralgia; Fifth Pair.
 Brown Mixture. See Licorice—Opium.
 Brown's Modification of Weber's Test. See Internal Ear.
 Brown-Séquard's Fluid. See Animal Extracts; Orchitis.
 Brucine. See Nux Vomica.
 Bruise. See Hamamelis—Lead.
 Bryant's Ilio-femoral Triangle. See Fractures of Femur.
 Bubo. See Europhen—Penis and Testicles; Undescended Testicle—Phenic (Carbolic) Acid—Plague—Silver; Venereal Disorders—Syphilis.
 Bubo, Hæmorrhagic. See Plague.
 Bubonic Plague. See Plague.
 Bucket-fever. See Specific Infectious Fevers; Dengue.

- Buck's Traction-splints. See Fractures of Femur.
 BUCKTHORN (*General Subject*).
 Buffalo Lithia-water. See Lithium.
 Buisson's Bath. See Rabies.
 Bulbar Paralysis. See Encephalitis; Acute Non-suppurative.
 Bulbar Paralysis, Progressive. See Tumors of Brain; Tumors of Medulla.
 Bulimia. See Stomach, Diseases of; Functional Diseases.
 Bullæ. See Spinal Cord; Syringomyelia.
 Bullet Wounds. See Wounds, Bullet (Index).
 Bullet Wounds of Spine. See Spine, Diseases of; Wounds.
 Bullous Eruption. See Dermatitis Herpetiformis—Dermatitis Medicamentosa—Pemphigus—Variola; Vaccinia.
 Bullous Keratitis. See Keratitis.
 Bunion. See Tendons; Bursitis.
 Buphthalmos. See Tension of Eyeball; Glaucoma.
 Burgundy Wine. See Alcohol.
 Burnett's Disinfecting Fluid. See Zinc.
 BURNS (*General Subject*). See Aluminium—Aristol—Bright's Disease; Acute—Dermatitis Gangrenosa—Euophen—Exalgin—Guaiacon—Hæmoglobinuria—Ichthyol—Intestines; Duodenum; Ulceration—Iodine; Aristol—Iodine; Loretin—Lead—Linum—Olive-oil—Orthoform—Phenic (Carbolic) Acid—Phenic (Carbolic) Acid; Diaphtherin—Phenocoll—Picric Acid—Potassium; Ferrifuges—Potassium; Soziodolate—Quebracho—Resinol; Pyrocatechin—Salol—Sodium; Cutaneous Disorders—Surgical Diseases of the Skin and its Appendages; Lightning-stroke—Surgical Diseases of the Skin and its Appendages; Malignant Degeneration of Scars—Thiol.
 Burns of Conjunctiva. See Conjunctiva.
 Burns of Cornea. See Cornea.
 Burns, Suppurative. See Creasote.
 Bursæ. See Tendons—Tumors; Cysts.
 Bursitis. See Tendons.
 Bursitis, Subiliac. See Tendons; Bursitis.
 Butter of Zinc. See Zinc.
 Buttercup Eruption. See Dermatitis Venenata.
 Buttock, Abscess of. See Hip-joint Disease.
 Button, Murphy. See Stomach, Surgery of; Intestines; Anastomosis.
 Butyl-chloral. See Chloral.
 Butyl-chloral-antipyrine. See Chloral.
 Butyl-chloral-hydrate. See Chloral.
 Butyl-hypnal. See Chloral.
 Buxton Spring-water. See Gout.
 Buzzing in Ears. See Tinnitus (Index)—Vascular System; Injuries of Blood-vessels; Hæmorrhage.
 Byrd's Method of Artificial Respiration. See Pulmonary Circulation; Atelectasis.
- Cachexia. See Intestines; Tumors—Ozone—Stomach, Diseases of; Carcinoma—Stomach, Diseases of; Gastric Ulcer—Tumors of Brain; Encephaloid—Tumors of Larynx and Lungs; Carcinoma of Lungs—Tumors of Rectum and Anus; Malignant Growths—Urinary System, Diseases of (Surgical); Tumors of Kidney—Urinary System, Surgical Diseases of; Tumors of Prostate—Uterine Adnexa; Tumors of Ovaries—Uterus; Sarcoma.
 Cachexia, Malarial. See Malarial Cachexia (Index).
 Cachexia, Mercurial. See Mercury, Untoward effects.
 Cachexia Thyreopriva, Operative, See Infantile Myxœdema.
 Cacodylic Acid. See Arsenic.
 Cade. See Juniper.
 Cade, Oil of. See Juniper.
 Cæcal Hernia. See Hernia.
 Cæcectomy. See Stomach, Surgery of; Intestines; Resection.
 Cæcitis. See Intestines; Typhlitis.
 Cæcum, Carcinoma of. See Intestines; Tumors.
 Cæcum, Diseases of. See Intestines.
 Cæcum, Tumors of. See Intestines—Intestines; Tumors.
 Cæcum, Ulceration of. See Silver; Gastro-Intestinal Disorders.
 Cæsarean Section. See Parturition, Abnormal.
 Caffearine. See Coffee.
 Caffeine. See Alkaloids—Coffee.
 Caffeine Bromohydrate. See Bromides.
 Caffone. See Coffee.
- Caffeotannic Acid. See Coffee.
 CAJUPUT-OIL (*General Subject*).
 Cajuputol. See Cajuput-oil.
 Cake-meal. See Linum.
 Calabar Bean. See Physostigma.
 Calabar Bean, Poisoning by. See Atropine.
 Calabarine. See Physostigma.
 Calcic Liver of Sulphur. See Sulphur.
 CALCIUM (*General Subject*). See Asaprol.
 Calcium Salicylate. See Salicylic Acid.
 Calculi, Biliary. See Cholelithiasis.
 Calculi in Stools. See Stools, Calculi in (Index).
 Calculi in Ureter. See Urinary System, Diseases of (Surgical); Ureters.
 Calculi, Pancreatic. See Pancreas.
 Calculi, Prostatic. See Urinary System, Surgical Diseases of.
 Calculi, Renal. See Renal Calculus (Index).
 Calculi, Uric Acid. See Uric-Acid Calculi (Index).
 Calculi, Urinary. See Digitalis.
 Calculi, Vesical. See Piperazin—Urinary System, Surgical Diseases of—Urinary System, Surgical Diseases of; Chronic Prostatitis—Urinary System, Surgical Diseases of; Hypertrophy of Prostate—Urinary System, Surgical Diseases of; Tuberculosis of Prostate.
 Calculous Pyelitis. See Urinary System, Diseases of; Pyelitis.
 Calisaya Bark. See Cinchona.
 Callous Formation after Fractures, Defective. See Sulphur; Respiratory Disorders.
 Callous Ulcers. See Sulphur; Respiratory Disorders.
 Callus. See Fractures.
 Calmette's Antivenine. See Leprosy.
 Calmette's Antivenomous Serum. See Wounds and Stings; Snake-bites.
 Calomel. See Antipyrine, Dose—Croup; Membranous—Mercury; Chlorides.
 Calomel Eruption. See Dermatitis Medicamentosa.
 Calomel Fumigation. See Diphteria—Fumigation, Calomel (Index).
 Calves of Legs, Cramps in. See Toxic Foods; Meat Poisoning.
 Calx Sulphurata. See Sulphur.
 Camp-fever. See Typhus Fever.
 Camphoid. See Camphor.
 CAMPHOR (*General Subject*).
 Camphor-ball. See Camphor.
 Camphor Eruption. See Dermatitis Medicamentosa.
 Camphor Salicylate. See Salicylic Acid.
 Camphor, Tar. See Naphthalin.
 Camphoric Acid. See Camphor—Tuberculosis of Lungs.
 Camphoroxol. See Hydrogen Dioxide.
 Canada Balsam. See Turpentine.
 Canada Turpentine. See Turpentine.
 Canadian Hemp. See Apocynum Cannabinum.
 Canaliculi, Absence of. See Lacrymal Apparatus; Excretory Apparatus.
 Cancer. See Carcinoma (Index)—Tumors.
 Cancer, Gastric. See Anæmia, Pernicious—Stomach, Cancer of (Index).
 Cancer of Bile-ducts. See Liver; Tumors of Biliary Tract.
 Cancer of Breast. See Mammary Gland, Cancer of (Index)—Tumors of Breast.
 Cancer of Breast, Encephaloid. See Tumors of Breast; Cancer—Tumors of Breast; Encephaloid.
 Cancer of Breast, Halsted's Operation for. See Tumors of Breast.
 Cancer of Breast, Scirrhus. See Tumors of Breast; Cancer.
 Cancer of Cervix Uteri. See Iodine; Aristol.
 Cancer of Gall-bladder. See Gall-bladder, Cancer of (Index).
 Cancer of Larynx. See Tumors of Larynx and Lungs; Malignant Tumors of Larynx.
 Cancer of Liver. See Liver, Cancer of (Index).
 Cancer of Mammary Gland. See Dermatitis Maligna—Mammary Gland, Cancer of (Index).
 Cancer of Pancreas. See Pancreas, Cancer of (Index).
 Cancer of Penis. See Penis, Cancer of (Index).
 Cancer of Rectum. See Tumors of Rectum and Anus; Malignant Growths.
 Cancer of Stomach. See Stomach, Cancer of (Index).
 Cancer of Thyroid. See Thyroid Gland; Tumors.
 Cancer of Tongue. See Tongue; Cancer.

- Cancer of Tongue, Epitheliomatous. See Tongue; Leukoplakia.
- Cancer, Rectal. See Magnesia; Rectal Disorders.
- Cancer, Rodent. See Tuberculosis of Skin; Lupus Vulgaris.
- Cancer, Uterine. See Uterine Cancer (Index).
- Cancer, Vaginal. See Menopause.
- Cancerous. See Carcinomatous (Index).
- Cancerous Peritonitis. See Peritonitis, Cancerous (Index).
- Cancerous Ulcer of Larynx. See Tuberculosis of Larynx.
- Cancerous Ulcer of Tongue. See Tongue; Ulceration.
- Cancerous Ulceration. See Chronic Acid.
- Cancroid Growth. See Surgical Diseases of the Skin and its Appendages; Malignant Degeneration of Scars.
- Cancrum Oris. See Copper—Mouth; Gangrenous Stomatitis—Nitric Acid.
- Canker-spots of Mouth. See Herpes.
- Cannabin. See Cannabis Indica.
- Cannabindon. See Cannabis Indica.
- Cannabine. See Cannabis Indica.
- Cannabinine. See Cannabis Indica.
- Cannabis-Indica Eruption. See Dermatitis Medicamentosa.
- CANNABIS INDICA SEU SATIVA (*General Subject*).
- Canned-Meat Poisoning. See Cholera Morbus.
- Cantani's Formula. See Cholera Asiatica.
- CANTHARIDES (*General Subject*). See Bright's Disease; Acute—Cystitis—Hæmaturia.
- Cantharides Eruption. See Dermatitis Venenata.
- Cantharidine. See Cantharides.
- Canquoin's Paste. See Zinc.
- Capillary Bronchitis. See Pneumonia, Catarrhal.
- Capillary Pulse. See Valvular Diseases of Heart; Aortic Regurgitation.
- Capillary Thrombosis. See Vascular System; Vascular Obstruction; Thrombosis.
- Capillary Varix of Scalp. See Wounds of Head; Tumors of Scalp.
- Capsicum Eruption. See Dermatitis Venenata.
- Capsular Advancement. See Strabismus.
- Capsular Cirrhosis. See Cirrhosis of the Liver.
- Caput Succedaneum. See Wounds of Head; Tumors of Scalp.
- Carasquilla's Serum. See Leprosy.
- Carbazotic Acid. See Picric Acid.
- Carbolic Acid. See Bright's Disease, Acute—Laryngitis; (Edema—Esophagus; Injuries—Esophagus; Esophagitis—Petroleum—Phenic Acid—Picric Acid—Pix Liquida; Lysol—Salol.
- Carbolic-Acid Eruption. See Erythema Scarlatini-forme.
- Carbolic-Acid Gangrene. See Wounds (Septic); Gangrene.
- Carbolic Acid, Glycerite of. See Glycerin.
- Carbolic-Acid Treatment. See Tetanus.
- Carbon-Dioxide Poisoning. See Sodium; Antidotal Uses.
- Carbon Sulphide. See Insanity; Acute Confusional.
- Carbon-Sulphide Poisoning. See Hysteria.
- Carbonic-Oxide Poisoning. See Glycosuria.
- Carbonyl-chloride. See Chloroform.
- Carbuncle. See Airol—Anthrax—Creasote—Euphen—Phenic (Carbolic) Acid—Phosphorus—Plague—Potassium; Caustics—Potassium; Chlorate—Salol—Surgical Diseases of the Skin and its Appendages—Surgical Diseases of the Skin and its Appendages; Furuncle—Thiol.
- Carbunculus. See Surgical Diseases of the Skin and its Appendages; Carbuncle.
- Carcinoma. See Actinomycosis—Adenitis; Chronic—Alcohol—Animal Extracts; Thyroid—Anorexia Nervosa—Arsenic—Atropine—Cancer (Index)—Fractures—Methyl-blue—Pepsin—Petroleum—Potassium; Caustics—Tumors—Tumors; Epithelial (Organoid).
- Carcinoma, Gastric. See Gastric Carcinoma (Index).
- Carcinoma, Intestinal. See Intestinal Carcinoma (Index).
- Carcinoma, Laryngeal. See Tumors of Larynx and Lungs; Sarcoma of Larynx.
- Carcinoma, Nasal. See Nasal Cavities; Tumors.
- Carcinoma, (Esophageal. See Esophagus, Carcinoma of (Index).
- Carcinoma of Bile-ducts. See Liver; Tumors of Biliary Tract.
- Carcinoma of Breast. See Cancer of Breast (Index).
- Carcinoma of Cæcum. See Intestines; Tumors.
- Carcinoma of Cervix Uteri. See Uterus; Carcinoma.
- Carcinoma of Clitoris. See Clitoritis.
- Carcinoma of Colon. See Intestines; Tumors.
- Carcinoma of Cornea. See Cornea; Tumors.
- Carcinoma of Duodenum. See Intestines; Tumors.
- Carcinoma of Endometrium. See Endometrium, Carcinoma of (Index).
- Carcinoma of Eyelids. See Palpebræ; Tumors.
- Carcinoma of Fallopian Tubes. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Carcinoma of Gall-bladder. See Liver; Tumors of Biliary Tract.
- Carcinoma of Intestine. See Stomach, Surgery of; Intestines; Anastomosis.
- Carcinoma of Kidney. See Urinary System, Diseases of (Surgical); Tumors of Kidney.
- Carcinoma of Lips. See Lips, Carcinoma of (Index).
- Carcinoma of Liver. See Liver, Cancer of (Index).
- Carcinoma of Lung. See Tumors of Larynx and Lungs; Lungs.
- Carcinoma of Mammary Gland. See Dermatitis Maligna.
- Carcinoma of Maxillary Gland. See Salivary Glands; Tumors.
- Carcinoma of Ovary. See Uterine Adnexa; Tumors of Ovaries.
- Carcinoma of Parotid Gland. See Salivary Glands; Tumors.
- Carcinoma of Penis. See Penis, Cancer of (Index).
- Carcinoma of Peritoneum. See Peritoneum; Tumors.
- Carcinoma of Pharynx. See Tonsils; Tumors.
- Carcinoma of Pleura. See Pleura; New Growths.
- Carcinoma of Prostate. See Urinary System, Surgical Diseases of; Tumors of Prostate.
- Carcinoma of Spinal Cord. See Spine, Diseases of; Tumors.
- Carcinoma of Spleen. See Spleen; Tumors.
- Carcinoma of Stomach. See Stomach, Carcinoma of (Index).
- Carcinoma of Testicles. See Penis and Testicles; Tumors of Testicles.
- Carcinoma of Thyroid Gland. See Goitre.
- Carcinoma of Uterus. See Uterine Carcinoma (Index).
- Carcinoma of Vagina. See Vagina; Malignant Growths.
- Carcinoma of Vulva. See Vagina; Tumors of Vulva.
- Carcinoma, Orbital. See Orbit; Tumors.
- Carcinoma, Pyloric. See Pyloric Carcinoma (Index).
- Carcinoma, Uterine. See Uterine Carcinoma (Index).
- Carcinomatous Growths. See Manganese—Nitric Acid.
- Carcinomatous Ulcer. See Stomach, Diseases of; Gastric Ulcer.
- Carcinomatous Ulcerations. See Chronic Acid.
- Cardia, Stricture of. See Stomach, Diseases of; Toxic Gastritis.
- Cardiac. See Heart (Index).
- Cardiac Albuminuria. See Potassium; Cobalto-nitrite.
- Cardiac Aneurism. See Myocarditis.
- Cardiac Arrhythmia. See Fatty Heart.
- Cardiac Asthma. See Angina Pectoris—Bright's Disease; Chronic—Chloral—Fatty Heart—Jalap—Myocarditis—Oxygen.
- Cardiac Crises. See Locomotor Ataxia.
- Cardiac Dilatation. See Heart, Dilatation of (Index)—Vascular System; Arteriosclerosis.
- Cardiac Diseases. See Pregnancy, Disorders of—Pulmonary Circulation; Hemorrhage—Specific Infectious Fevers; Terminal Infections.
- Cardiac Disorders. See Aconite—Strontium.
- Cardiac Dyspnoea. See Nitrites.
- Cardiac Epilepsy. See Epilepsy.
- Cardiac Failure. See Ether; Therapeutics—Ether; Untoward Effects—Nitrites.
- Cardiac Hypertrophy. See Heart; Hypertrophy of (Index)—Vascular System; Arteriosclerosis—Veratrum Viride.
- Cardiac Insufficiency. See Oxygen.
- Cardiac Irregularities. See Nerves, Peripheral; Localized Neuritis—Vasculo-Cardiac Neuroses; Irregular Heart.
- Cardiac Liver. See Liver; Passive Congestion.
- Cardiac Neuritis. See Bromides.

- Cardiac Neuroses, Vasculo-. See Vasculo-Cardiac Neuroses.
- Cardiac Edema. See Mercury; Chlorides.
- Cardiac Palpitation. See Cannabis Indica; Cardiac Diseases.
- Cardiac Paralysis. See Heart, Paralysis of (Index); —Strophanthus; Poisoning—Wounds and Stings; Snake-bites.
- Cardiac Psychoses. See Valvular Diseases of Heart; Aortic Regurgitation.
- Cardiac Stimulant. See Stimulant, Cardiac (Index).
- Cardiac Syncope. See Physostigma; Poisoning.
- Cardiac Thrombosis. See Vascular System; Vascular Obstruction; Thrombosis.
- Cardiac Wall, Rupture of. See Vascular System; Arteriosclerosis.
- Cardiac Weakness. See Strophanthus.
- Cardialgia. See Digitalis.
- Cardiospasm. See Stomach, Diseases of; Functional Diseases.
- Carditis. See Myocarditis.
- Caries. See Sulphur; Respiratory Disorders.
- Caries, Cervical. See Muscles; Torticollis.
- Caries, Dental. See Manganese—Orthoform—Phosphorus; Phosphates.
- Caries of Bone. See Osseous System; Bone Tuberculosis.
- Caries of Cranial Bones. See Wounds of Head; Diseases Involving Skull.
- Caries of Orbital Walls. See Orbit; Miscellaneous Diseases.
- Carlsbad Salts. See Cholelithiasis.
- Carlsbad Water. See Diabetes Mellitus—Gout.
- Carminative. See Cajuput-oil—Gaultheria—Mace—Mentha.
- Carmine-chloral. See Chloral.
- Carniferrin. See Iron.
- Carnochan's Operation. See Neuralgia.
- Carnogen. See Anæmia.
- Carotid Aneurism. See Aneurism.
- Carphologia. See Typhoid Fever.
- Carpus, Dislocations of. See Dislocations.
- Carpus, Fracture of. See Fractures.
- Carron Oil. See Linum.
- Cartagean Bark. See Cinchona.
- Cartilaginous Growths of Rectum. See Tumors of Rectum and Anus; Enchondromata.
- Cartilaginous Tumors. See Tumors; Connective Tissue—Tumors; Enchondroma.
- Caruncle, Urethral. See Phenic (Carbolic) Acid.
- Cascara Cordial. See Buckthorn.
- Cascara Sagrada. See Buckthorn.
- Cascarin. See Buckthorn.
- Cassia. See Cinnamon.
- Castor-oil. See Mole Fern; Poisoning—Nursing; Breast-milk.
- Castration. See Penis and Testicles—Urinary System, Surgical Diseases of; Hypertrophy of Prostate.
- CATALEPSY (*General Subject*). See Nitrites.
- Cataleptic Condition. See Hypnotism—Insanity; Acute Confusional.
- Cataleptoid State. See Insanity; Catatonia.
- CATARACT (*General Subject*). See Atropine—Boracic Acid—Diabetes Mellitus—Homatropine—Leprosy—Tension of Eyeball; Glaucoma—Typhoid Fever.
- Cataract, Incipient. See Physostigma.
- Cataracta Natans. See Lens.
- Catarrh, Aural. See Tonsils; Hypertrophy.
- Catarrh, Bronchial. See Bronchial Catarrh (Index).
- Catarrh, Dry. See Nasal Cavities; Atrophic Rhinitis.
- Catarrh, Duodenal. See Duodenal Catarrh (Index).
- Catarrh, Fœtid. See Nasal Cavities; Atrophic Rhinitis.
- Catarrh, Gastric. See Gastric Catarrh (Index).
- Catarrh, Gastro-Intestinal. See Gastro-Intestinal Catarrh (Index).
- Catarrh, Hepatic. See Salol.
- Catarrh, Intestinal. See Intestinal Catarrh (Index).
- Catarrh of Aged, Bronchial. See Turpentine.
- Catarrh of Upper Air-passages. See Thymol.
- Catarrh, Post-nasal. See Naso-pharynx; Chronic Naso-pharyngitis.
- Catarrh, Vesical. See Thymol.
- Catarrhal Bronchitis. See Bronchitis; Fibrinous.
- Catarrhal Conditions. See Sodium; Laryngological Disorders.
- Catarrhal Conjunctivitis. See Conjunctivitis, Catarrhal (Index).
- Catarrhal Croup. See Croup.
- Catarrhal Diphtheria. See Diphtheria; Pharyngeal.
- Catarrhal Disorders. See Zinc.
- Catarrhal Dysentery. See Dysentery.
- Catarrhal Enteritis. See Intestines; Inflammation of.
- Catarrhal Fever. See Salol.
- Catarrhal Jaundice. See Jaundice; Obstructive—Sodium, Gastro-Intestinal Disorders.
- Catarrhal Laryngitis. See Laryngitis, Catarrhal (Index).
- Catarrhal Pneumonia. See Pneumonia, Catarrhal.
- Catarrhal Rhinitis. See Rhinitis, Catarrhal (Index).
- Catarrho-rheumatic Ophthalmia. See Conjunctiva; Catarrhal Conjunctivitis.
- Catarrh-snuffs. See Erythroxylon Coca and Cocaine.
- Catatonia. See Catalepsy—Insanity; Catatonia—Insanity; Melancholia.
- Catechol. See Resorcin; Pyrocatechin.
- Catgut. See Formaldehyde.
- Cathartic. See Aloes—Buckthorn (Cascara)—Colchicum—Colocynth—Elatium—Jalap—Licorice—Magnesia—Mercury; Chlorides—Mercury; Metallic—Phosphorus; Phosphates—Podophyllum—Potassium.
- Cathartic, Saline. See Nursing; Breast-milk.
- Catheter Fever. See Aconite—Urinary System, Surgical Diseases of.
- Catheterization. See Erythroxylon Coca and Cocaine—Urinary System, Surgical Diseases of; Hypertrophy of Prostate.
- Catheterization of Ureters. See Ureters, Catheterization of (Index).
- Catheters, Lubricant for. See Petroleum.
- Cauliflower Excrecence. See Surgical Diseases of the Skin and its Appendages; Verruæ.
- Caustic. See Chromic Acid—Copper—Creasote—Hydrochloric Acid—Mercury; Nitrates—Nitric Acid—Potassium; Caustics—Oxalic Acid—Phenic (Carbolic) Acid—Pyrogallol—Silver—Zinc; Cutaneous Disorders.
- "Caustic Arrow," Maisonneuve's. See Zinc; Cutaneous Disorders.
- Caustic Potash. See Potassium; Caustics.
- Caustic Soda. See Sodium.
- Cauterization. See Epistaxis—Europen—Glanders—Keratitis.
- Cautery, Galvano-. See Galvanocautery (Index).
- Cavernous Angioma. See Angioma, Cavernous (Index).
- Cavernous Lymphangioma. See Tumors; Connective Tissue.
- Cavernous Nevus. See Tumors; Connective Tissue.
- Cavernous Sinus, Blocking of. See Vascular Diseases of Brain; Thrombosis of Sinuses.
- Cavities in Lung. See Tuberculosis of Lungs.
- Cavities, Pulmonary. See Pulmonary Abscess and Gangrene.
- Ceinture. See Spinal Cord; Myelitis.
- Cellular Hypertrophy. See Vascular System; Phlegmasia Alba Dolens.
- Cellulitis. See Erysipelas—Scarlet Fever—Status Lymphaticus; Lymphangitis—Urinary System, Surgical Diseases of; Rupture of Bladder—Urinary System, Surgical Diseases of; Rupture of Urethra—Variola; Vaccinia.
- Cellulitis, Orbital. See Orbit.
- Cementome. See Tumors; Connective Tissue.
- Centipede's Bite. See Wounds and Stings.
- Central Scotoma. See Scotoma, Central (Index).
- Centriobular Cirrhosis. See Cirrhosis of the Liver.
- Centripetal Cirrhosis. See Cirrhosis of the Liver.
- Centripetal Venous Pulse. See Valvular Diseases of Heart; Aortic Regurgitation.
- Cephalalgia. See Cannabis Indica—Coffee; Caffeine—Menthol—Nitroglycerin—Thyroid Gland; Thyroiditis—Toxic Foods; Grain Poisoning.
- Cephalalgia, Frontal. See Toxic Foods; Meat Poisoning.
- Cephalalgia, Syphilitic. See Syphilis; Infectious Secretions.
- Cephalhematoma. See Encephalocoele—Wounds of Head; Tumors of Scalp.
- Cerebellar Tumor. See Hysteria.
- Cerebellitis. See Encephalitis.
- Cerebellum, Tumor of. See Spinal Cord; Ataxic Paraplegia—Tumors of Brain.
- Cerebral. See Brain (Index).
- CEREBRAL ABSCESS (*General Subject*). See Brain Abscess (Index)—Encephalitis; Suppurative—

- Cerebral Abscess. See Meningitis; Leptomeningitis.
- Cerebral Anæmia. See Nitrites—Nitroglycerin—Surgical Diseases of the Skin and its Appendages; Constitutional Effects of Cold.
- Cerebral Apoplexy. See Cerebral Hæmorrhage—Uræmia.
- Cerebral Atony. See Phosphorus.
- Cerebral Concussion. See Head, Injuries of.
- Cerebral Congestion. See Elaterium—Infants, Diarrheal Diseases of—Surgical Diseases of the Skin and its Appendages; Constitutional Effects of Cold.
- Cerebral Contusions. See Head, Injuries of.
- Cerebral Endarteritis. See Phosphorus.
- CEREBRAL HÆMORRHAGE (*General Subject*). See Bright's Disease; Non-exudative Chronic—Insanity; Post-apoplectic—Insolation—Myxœdema—Valvular Diseases of Heart; Aortic Regurgitation—Vascular Diseases of Brain; Thrombosis—Vascular System; Vascular Obstruction; Fat-embolism.
- Cerebral Hemiplegia. See Alcoholic Neuritis.
- Cerebral Inflammation. See Wounds of Head; Extradural Hæmorrhage.
- Cerebral Injuries. See Pulmonary Circulation; Œdema.
- Cerebral Laceration. See Wounds of Head; Wounds of Brain.
- Cerebral Localization. See Wounds of Head.
- Cerebral Meningitis. See Meningitis.
- Cerebral Neurasthenia. See Insanity; General Paralysis.
- Cerebral Œdema, Traumatic. See Wounds of Head; Wounds of Brain.
- Cerebral Operations, Technique of. See Wounds of Head; Technique of Intracranial Surgery.
- Cerebral Palsies. See Lead: Chronic Poisoning—Spinal Cord; Poliomyelitis.
- Cerebral Paralysis. See Strychnine; Nervous Disorders.
- Cerebral Rheumatism. See Rheumatism; Acute.
- Cerebral Scarlet Fever. See Scarlet Fever; Malignant.
- Cerebral Sclerosis. See Sclerosis of Brain.
- Cerebral Softening. See Phosphorus.
- Cerebral Stimulant. See Stimulant, Cerebral (Index).
- Cerebral Syphilis. See Syphilis, Cerebral (Index).
- Cerebral Tumors. See Brain, Tumors of (Index)—Tumors, Cerebral (Index).
- Cerebritis. See Encephalitis—Quinine; Contra-indications—Veratrum Viride.
- Cerebritis, Chronic. See Tumors of Brain.
- Cerebro-Spinal Fever. See Typhus Fever.
- Cerebro-Spinal Leptomeningitis, Tubercular. See Meningitis.
- Cerebro-Spinal Meningitis. See Meningitis, Cerebro-Spinal (Index).
- Cerebro-Spinal Syphilis. See Syphilis; Period of Sequelæ.
- CERIUM (*General Subject*).
- Cerium, Oxalate of. See Oxalate of Cerium (Index).
- Cerumen, Impacted. See Hydrogen Dioxide.
- Cerumen in Ear. See External Ear.
- Cerumen, Insipated. See External Ear.
- Ceruse. See Lead.
- Cervical Adenitis. See Specific Infectious Fevers; Relapsing.
- Cervical Caries. See Muscles; Torticollis.
- Cervical Endometritis. See Uterus; Tuberculosis.
- Cervical Glands, Diseased. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
- Cervical Pachymeningitis. See Hypnotism; Organic Disease.
- Cervical Sympathetic, Section of. See Exophthalmic Goitre.
- Cervico-Brachial Neuralgia. See Neuralgia.
- Cervico-Occipital Neuralgia. See Neuralgia.
- Cervix Uteri, Atresia of. See Parturition, Abnormal.
- Cervix Uteri, Cancer of. See Iodine; Aristol.
- Cervix Uteri, Carcinoma of. See Uterus; Carcinoma.
- Cervix Uteri, Dilatation of. See Erythroxylon Coca and Cocaine—Parturition, Abnormal—Pregnancy, Disorders of.
- Cervix Uteri, Erosions of. See Ichthyol—Phenic (Carbolic) Acid: Phenosalyl—Silver; Gynæcology.
- Cervix Uteri, Gonorrhœa of. See Urinary System, Surgical Diseases of; Gonorrhœa in Women.
- Cervix Uteri, Incisions of. See Parturition, Abnormal.
- Cervix Uteri, Lacerations of. See Uterus.
- Cervix Uteri, Puerile. See Uterus; Malformations.
- Cervix Uteri, Rigidity of. See Parturition, Abnormal.
- Cervix Uteri, Sarcoma of. See Uterus; Sarcoma.
- Cervix Uteri, Spasm of. See Parturition, Abnormal.
- Cervix Uteri, Stenosis of. See Uterus—Uterus; Malformations.
- Cervix Uteri, Tuberculosis. See Uterus; Tuberculosis.
- Cervix Uteri, Tumor of. See Uterus; Carcinoma of Cervix Uteri.
- Cervix Uteri, Ulceration of. See Quebracho—Uterus; Carcinoma of Cervix Uteri.
- Cestodes. See Parasites, Intestinal.
- Ceylon Anæmia. See Beriberi.
- Chafing. See Dermatitis Traumatica; Intertrigo.
- Chagres Fever. See Malarial Fevers.
- Chalazion. See Palpebre.
- Chalcosis. See Pneumonokoniosis.
- Chalk, Precipitated. See Calcium.
- Chalk, Prepared. See Calcium.
- Chalybeates. See Iron.
- CHAMOMILE (*General Subject*).
- Champagne. See Alcohol.
- Chancre. See Aristol—Copper—Herpes Genitalis—Hydrogen Dioxide—Iodine; Iodol—Mercury—Penis and Testicles; Herpes Progenitalis—Phenic (Carbolic) Acid; Trichlorphenol—Pyrogallol—Salicylic Acid—Salicylic Acid; Mercuric Salicylate—Syphilis—Syphilis; Initial Lesion.
- Chancre, Crustaceous. See Syphilis; Initial Lesion.
- Chancre, Diphtheritic. See Syphilis; Initial Lesion.
- Chancre, Diphtheroid. See Syphilis; Initial Lesion.
- Chancre, Hæmorrhagic. See Syphilis; Initial Lesion.
- Chancre, Herpetiform. See Syphilis; Initial Lesion.
- Chancre, Hunterian. See Syphilis; Initial Lesion—Vagina; Vulva; Infectious Vulvitis.
- Chancre, Mixed. See Syphilis.
- Chancre of Conjunctiva. See Conjunctiva; Syphilis.
- Chancre of Lips. See Mouth; Lips; Carcinoma.
- Chancre of Penis. See Penis and Testicles; Herpes Progenitalis.
- Chancre, Phagedænic. See Syphilis.
- Chancre, Urethral. See Syphilis; Initial Lesion.
- Chancroid. See Aristol—Bismuth—Boracic Acid—Euphrophen—Herpes genitalis—Hydrastis—Hydrogen Dioxide—Iron—Nitric Acid—Penis and Testicles; Herpes Progenitalis—Resorcin—Resorcin; Resorcinol—Syphilis—Vagina; Vulva; Infectious Vulvitis.
- Chancroid of Clitoris. See Clitoritis.
- Chancroid of Penis. See Penis and Testicles; Herpes Progenitalis.
- Chancroidal Ulcer of Rectum. See Rectum and Anus; Non-malignant Ulceration.
- Chancroidal Vaginitis. See Vagina; Infectious Vaginitis.
- Chancroidal Vulvitis. See Vagina; Vulva; Infectious Vulvitis.
- Change of Life. See Menopause.
- Chapped Face. See Glycerin.
- Chapped Hands. See Hands, Chapped (Index).
- Chapped Lips. See Mouth and Lips; Lips, Diseases of.
- Chapping. See Magnesia.
- Charbon. See Anthrax.
- Charbon Bacilli. See Hydrogen Dioxide.
- Charcoal. See Potassium; Chlorate.
- Charcot, Arthropathies of. See Locomotor Ataxia.
- Charcot-Leyden Crystals. See Asthma—Bronchitis—Bronchitis; Fibrinous.
- Charcot-Leyden Crystals in Blood. See Leukæmia.
- Charcot's Disease. See Joints, Diseases of.
- Charcot's Method. See Hypnotism.
- Chaulmoogra-oil. See Chaulmoogra-oil.
- CHAULMOUGRA-OIL (*General Subject*). See Leprosy.
- Chautard's Test. See Acetonuria.
- Checkerberry. See Gaultheria.
- Cheek, Neuralgia of. See Sinuses; Ethmoiditis.
- Cheeks, Paralysis of. See Wounds of Head; Compression of Brain.
- Cheeks, Ulcers of. See Mercury; Poisoning—Mouth and Lips; Diseases of.
- Cheese Poisoning. See Cholera Morbus—Toxic Foods; Cream Poisoning.

- Cheloid. See Surgical Diseases of the Skin and its Appendages; Keloid.
- Chemosis, Conjunctival. See Conjunctiva; Miscellaneous Disorders.
- Chest. See Thorax (Index).
- Chest, Abscess of. See Pleurisy, Acute.
- Chest, Aspiration of. See Wounds and Injuries of Thorax; Operations.
- Chest, Barrel. See Barrel-chest (Index).
- Chest, Contusion of. See Wounds and Injuries of Thorax; Mural Injuries.
- Chest, Drainage of. See Wounds and Injuries of Thorax; Operations.
- Chest, Foreign Bodies in. See Wounds and Injuries of Thorax; Foreign Bodies in Chest.
- Chest, Incision of. See Wounds and Injuries of Thorax; Operations—Pleura; Pneumothorax.
- Chest, (Edema of. See Pleurisy, Acute.
- Chest, Tapping of. See Wounds and Injuries of Thorax; Operations.
- Cheyne-Stokes Respiration. See Bright's Disease; Non-exudative Chronic—Cerebral Hemorrhage; Other Symptoms—Cholera Infantum—Fatty Heart; Fatty Degeneration—Hydrocephalus; Acute—Malarial Fevers; Pernicious—Meningitis; Acute Leptomeningitis—Meningitis; Acute Spinal Leptomeningitis—Myocarditis—Paraldehyde.
- Chicken Poisoning. See Toxic Foods; Meat Poisoning.
- Chicken-pea Poisoning. See Toxic Foods; Grain Poisoning.
- Chicken-pox. See Varicella.
- Chicken-salad Poisoning. See Toxic Foods; Meat Poisoning.
- Chigo. See Wounds and Stings; Jigger.
- Chilblain. See Acne Rosacea—Benzoin—Creasote—Ichthyol—Pernio (Index)—Petroleum—Resorcin.
- Chilean Saltpeter. See Iodine.
- Chili Saltpeter. See Sodium.
- Chills. See Malarial Fevers—Rheumatism; Acute—Surgical Diseases; Secondary Wound Fever—Surgical Diseases of the Skin and its Appendages; Carbuncle—Tuberculosis of Lungs; Phthisis Florida—Typhoid Fever—Typhus Fever—Urinary System, Diseases of; Pyelitis—Urinary System, Surgical Diseases of; Abscess of Prostate—Urinary System, Surgical Diseases of; Acute Prostatitis—Urinary System, Surgical Diseases of; Urethral Fever—Uterine Adnexa; Inflammations of Ovary—Valvular Diseases of Heart; Acute Endocarditis—Variola—Wounds (Septic) and Gangrene; Pyæmia—Wounds (Septic) and Gangrene; Sapræmia—Yellow Fever.
- Chills and Fever. See Malarial Fevers.
- Chinese Sumach. See Ailantus.
- Chintum. See Cinchona.
- Chinidine. See Cinchona.
- Chinoidine. See Alkaloids—Cinchona.
- Chiragra. See Gout.
- CHLORAL (General Subject). See Nursing; Breast-milk.
- Chloral Poisoning. See Coffee—Strychnine; Antidotal Uses.
- Chloralamid. See Chloral—Diabetes Mellitus.
- Chloraloidal Poisoning. See Glycosuria.
- Chloral-camphor. See Camphor—Chloral.
- Chloral-hydrate Eruption. See Dermatitis Venenata.
- Chloralose. See Chloral.
- Chloranæmia. See Stomach, Diseases of; Chronic Gastritis—Stomach, Diseases of; Gastric Ulcer.
- Chlorinated Soda. See Sodium.
- Chlorobrom. See Chloral.
- CHLOROPFORM (General Subject). See Catalepsy—Ether; Comparative Values—Oxygen—Paraldehyde; Poisoning.
- Chloroform Eruption. See Dermatitis Medicamentosa.
- Chloroform Poisoning. See Hydrocyanic Acid—Strychnine; Antidotal Uses.
- CHLOROSIS (General Subject). See Aloes—Anæmia—Anæmia, Pernicious—Animal Extracts; Bonemarrow—Animal Extracts; Ovarian—Animal Extracts; Splenic—Copper—Fatty Heart; Fatty Degeneration—Iron—Magnesia—Manganese—Nux Vomica—Oxygen—Pericardium; Pericarditis—Stomach, Diseases of; Gastric Ulcer—Sulphur; Cutaneous Disorders—Valvular Diseases of Heart; Mitral Stenosis.
- Chlorosis, Egyptian. See Parasites, Intestinal; Anchylostoma.
- Chlorphenol. See Phenic (Carbolic) Acid.
- Choked Disk. See Optic Nerve and Retina; Optic Neuritis—Tumors of Brain.
- Choked Disk, Double. See Tumors of Brain; Tumors of Cerebellum—Tumors of Brain; Tumors of Corpora Quadrigemina.
- Cholæmia. See Jaundice; Obstructive.
- Cholagogue. See Aloes—Atropine—Benzoic Acid—Colchicum—Colocynth.
- Cholangitis. See Liver and Gall-bladder; Angiocholitis.
- Cholecystenterostomy. See Cholelithiasis.
- Cholecystitis. See Cholelithiasis—Liver and Gall-bladder; Angiocholitis.
- Cholecystitis, Acute Infectious. See Liver; Empyema of Gall-bladder.
- Cholecystitis, Acute Phlegmonous. See Liver; Empyema of Gall-bladder.
- Cholecystotomy. See Cholelithiasis.
- Choledochotomy. See Cholelithiasis.
- Choleocolithectomy. See Cholelithiasis.
- CHOLELITHIASIS (General Subject). See Gout; Irregular—Salol.
- Cholelithotripsy. See Cholelithiasis.
- Cholera. See Salicylic Acid; Cresol-salicylate—Sulphur; Fumigation—Toxic Foods; Ptomaines.
- CHOLERA ASIATICA (General Subject). See Abortion—Ammonia—Asiatic Cholera (Index)—Boric Acid; Sodium Biborate—Cajuput-oil—Cannabis Indica—Chloral—Cholera Morbus—Eucalyptus—Indicanuria—Lead—Malarial Fevers; Pernicious—Mercury; Chlorides—Naphthalin; Naphthol—Nitroglycerin—Nux Vomica—Ozone—Parasites; Trichina—Petroleum—Phenic (Carbolic) Acid; Bromol—Pix Liquida; Pixol—Quinine—Salol.
- Cholera Asiatica, Eruption of. See Erythema Multiforme—Erythema Symptomaticum.
- Cholera, Collapse of. See Sodium; Gastro-Intestinal Disorders.
- Cholera Drops, Swedish. See Opium.
- Cholera Drops, Thielmann's. See Opium.
- Cholera, Endemic. See Cholera Morbus.
- Cholera, Epidemic. See Epidemic Cholera (Index).
- Cholera Foudroyant. See Cholera Asiatica.
- CHOLERA INFANTUM (General Subject). See Arsenic—Atropine—Cajuput-oil—Cholera Morbus—Colocynth—Infants, Diarrheal Diseases of—Phenic (Carbolic) Acid—Quinine—Resorcin—Salicylic Acid; Bismuth Salicylate—Salicylic Acid; Calcium Salicylate—Silver; Gastro-Intestinal Disorders.
- CHOLERA MORBUS (General Subject). See Chloral—Cholera Infantum—Infants, Diarrheal Diseases of—Ipecac—Obstruction Intestinal—Phenic (Carbolic) Acid—Resorcin—Salol.
- Cholera Nostras. See Cajuput-oil—Cholera Morbus—Indicanuria—Resorcin.
- Cholera Siderans. See Cholera Asiatica.
- Cholera, Sporadic. See Cholera Morbus.
- Choleraic Diarrhæa. See Cholera Morbus.
- Cholesteatoma. See External Ear; Insipissated Cerumen—Middle Ear; Aural Polypi—Tumors.
- Cholesteræmia. See Jaundice; Obstructive.
- Cholesterin. See Cholelithiasis.
- Cholin. See Toxic Foods; Ptomaines.
- Choline. See Cannabis Indica.
- CHOLURIA (General Subject). See Infantile Myxœdema.
- Chondrodystrophia Fœtalís. See Infantile Myxœdema.
- Chondroma. See Tumors.
- Chondroma of Larynx. See Tumors of Larynx and Lungs; Larynx.
- Chondroma of Lung. See Tumors of Larynx and Lungs; Lungs.
- Chondroma of Maxillary Gland. See Salivary Glands; Tumors.
- Chondroma of Parotid Gland. See Salivary Glands; Tumors.
- Chondroma of Testicles. See Penis and Testicles; Tumors of Testicles.
- Chondromyoma. See Tumors; Myxomata.
- Chopart-Wolf's Mixture. See Copaba.
- Chordee. See Camphor—Chloral—Lupulus—Urinary System, Surgical Diseases of; Gonorrhœa.
- Chorditis Tuberosa. See Laryngitis; Chronic.
- CHOREA (General Subject). See Abortion—Arsenic—Bromides—Camphor—Cerium—Chloral—Cimicifuga—Copper—Exalgin—Gelsomium—Hyoscyamus—Hypnotism—Indicanuria—Iron—Lobelia—Naso-pharynx; Chronic Naso-pharyngitis—Neu-

- Chorea.
 rathenia—Nursing and Artificial Feeding; Nursing—Phenacetin; Lactophenin—Physostigma—Pregnancy, Disorders of—Quinine—Rheumatism; Acute—Salicylic Acid; Antipyrine Salicylate—Salicylic Acid; Guaiacol Salicylate—Salicylic Acid; Salicylamid—Salicylic Acid; Sodium Borosalicylate—Salicylic Acid; Strontium Salicylate—Salophen—Silver; Gastro-Intestinal Disorders—Silver; Silver Chloride—Strychnine; Nervous Disorders—Sulphonal—Zinc; Nervous Disorders.
- Chorea, Eruption in. See Erythema Symptomaticum.
- Chorea, Hereditary. See Spinal Cord; Hereditary Ataxia.
- Chorea, Huntington's. See Huntington's Chorea (Index).
- Chorea Insaniens. See Chorea; Sydenham's.
- Chorea, Posthemiplegic. See Athetosis—Cerebral Hæmorrhage—Chorea; Anomalous Varieties.
- Chorea, Prehemiplegic. See Cerebral Hæmorrhage.
- Choreic Movements. See Penis and Testicles; Phimosis.
- Choreiform Ataxia. See Spinal Cord; Hereditary Ataxia.
- Choreiform Disorders. See Parasites; Intestinal; Ascaris.
- Choreiform Twitchings. See Exophthalmic Goitre.
- Choreoid Movements. See Hysteria; Ataxia.
- Chorioretinitis. See Iris, Ciliary Body, and Choroid; Choroiditis.
- Chorioretinitis Syphilitica. See Vascular Diseases of Brain; Thrombosis.
- Choroid, Coloboma of. See Coloboma of Choroid (Index).
- Choroid, Disorders of. See Iris, Ciliary Body, and Choroid.
- Choroid, Ossification of. See Iris, Ciliary Body, and Choroid.
- Choroid, Sarcoma of. See Iris, Ciliary Body, and Choroid; Sarcoma.
- Choroidal Atrophy. See Iris, Ciliary Body, and Choroid; Choroiditis.
- Choroiditis. See Jaborandi—Mercury; Cyanide.
- Choroiditis, Suppurative. See Iris, Ciliary Body, and Choroid.
- Christensen's Test for Albumin. See Albuminuria; Tests.
- CHROMIC ACID (*General Subject*).
- CHRYSAROBIN (*General Subject*). See Anthrarobin.
- Chrysarobin Eruption. See Dermatitis Venenata.
- Chrysophanic Acid. See Chrysarobin—Rhubarb.
- Chrysotoxin. See Ergot.
- Chvostek's Sign. See Spasms in Children; Tetany.
- Chyle-cysts. See Tumors; Cysts.
- Chyle-cysts of Peritoneum. See Peritoneum; Tumors.
- Chylocoele. See Status Lymphaticus; Lymphangiectasis.
- Chylothorax. See Pleura.
- Chylous Pleurisy. See Pleura; chylothorax.
- Chylous Urine. See Chyluria (Index).
- CHYLURIA (*General Subject*). See Methylene-blue—Status Lymphaticus; Lymphangiectasis.
- Chyluria, Filaria. See Parasites; Filaria.
- Chyluria, Tropical. See Chyluria.
- Cicatricial Horns. See Tumors; Epithelial.
- Cicatricial Tumors. See Surgical Diseases of the Skin and its Appendages.
- Cicatrix. See Surgical Diseases of the Skin and its Appendages; Keloid.
- Cider. See Amyl-valerianate.
- Cigarette, Asthmatic. See Belladonna.
- Cigarette-wrappers. See Arsenic; Poisoning.
- Ciliary Body, Disorders of. See Iris, Ciliary Body, and Choroid.
- Ciliary Body, Gumma of. See Iris, Ciliary Body, and Choroid; Tumors.
- Ciliary Body, Sarcoma of. See Iris, Ciliary Body, and Choroid; Sarcoma.
- Ciliary Neurosis. See Respiratory Organs; Nasal Reflex Neuroses.
- Ciliary Staphyloma. See Iris, Ciliary Body, and Choroid; Tumors.
- CIMICIFUGA (*General Subject*).
- Cimicifugin. See Cimicifuga.
- CINCHONA (*General Subject*). See Malarial Fevers—Quinine.
- Cinchonidine. See Cinchona.
- Cinchonidine Salicylate. See Salicylic Acid.
- Cinchonidine Sulphate. See Alkaloids.
- Cinchonine. See Alkaloids—Cinchona—Iodine; Antiseptol.
- Cinchonine Salicylate. See Salicylic Acid.
- Cinnabar, Native. See Mercury.
- Cinnamic Acid. See Cinnamon—Tuberculosis of Lungs; Semispecifics.
- Cinnamic Aldehyde. See Cinnamon.
- CINNAMON (*General Subject*).
- Cinnamyl-acetate. See Cinnamon.
- Circinate Retinitis. See Optic Nerve and Retina; Retinitis.
- Circular Insanity. See Insanity; Recurrent.
- Circulatory Sedative. See Veratrum Viride.
- Circumcision. See Europhen—Penis and Testicles; Phimosis.
- Cirrhosis, Alcoholic. See Potassium; Purgatives.
- Cirrhosis, Arterial. See Cirrhosis of the Liver.
- Cirrhosis Arthracotica. See Cirrhosis of the Liver; Sporadic.
- Cirrhosis, Biliary. See Cirrhosis of the Liver.
- Cirrhosis, Capsular. See Cirrhosis of the Liver.
- Cirrhosis, Centrilobular. See Cirrhosis of the Liver.
- Cirrhosis, Centripetal. See Cirrhosis of the Liver.
- Cirrhosis, Hanot's. See Cirrhosis of the Liver; Biliary.
- Cirrhosis, Hepatic. See Hepatic Cirrhosis (Index).
- Cirrhosis of Ovary. See Uterine Adnexa; Inflammation of Ovary.
- CIRRHOSIS OF THE LIVER (*General Subject*). See Liver, Cirrhosis of (Index).
- Cirrhosis, Portal. See Portal Cirrhosis (Index).
- Cirrhosis, Secondary. See Cirrhosis of the Liver.
- Cirrhosis, Sporadic. See Cirrhosis of the Liver.
- Cirrhosis, Vascular. See Cirrhosis of the Liver.
- Cirrhotic Kidney. See Bright's Disease; Chronic.
- Cirsoid Aneurism. See Aneurism.
- Citric Acid. See Phenacetin; Apolysin.
- Citrine Ointment. See Mercury; Nitrates.
- Citrullin. See Colocynth.
- Citrullus Colocynth. See Colocynth.
- Clammy Perspiration. See Sulphur; Poisoning.
- Clammy Sweats. See Zinc; Poisoning.
- Clamp-and-Cautery Operation. See Hæmorrhoids.
- Claret. See Alcohol.
- Claviceps Purpurea. See Ergot.
- Clavicle, Dislocations of. See Dislocations.
- Clavicle, Fracture of. See Fractures.
- Clavus. See Surgical Diseases of the Skin and its Appendages.
- Clay-Colored Stools. See Stools, Clay-Colored (Index).
- Cleft Eyelid. See Palpebræ; Anomalies.
- Cleft Palate. See Plastic Surgery.
- Cleidotomy. See Parturition, Abnormal.
- Clemen's Solution. See Arsenic—Bromides.
- Climacteric, Disorders of. See Menopause—Nitrates.
- Climacteric Insanity. See Insanity; Climacteric.
- Climatic Treatment. See Asthma—Tuberculosis of Lungs.
- Clitoris, Carcinoma of. See Clitoritis.
- Clitoris, Chancroid of. See Clitoritis.
- Clitoris, Cystic Disease of. See Clitoritis.
- Clitoris, Herpes of. See Herpes Genitalis.
- Clitoris, Hypertrophy of. See Clitoritis.
- Clitoris, Sarcoma of. See Clitoritis.
- Clitoris, Syphilitic New Growth of. See Clitoritis.
- CLITORITIS (*General Subject*).
- Clonus, Ankle-. See Ankle-clonus (Index).
- Clubbing of Arytenoids. See Tuberculosis of Larynx.
- Clubbing of Ends of Fingers. See Fingers, Clubbing of Ends of (Index).
- Clubbing of Toes. See Pleurisy; Chronic.
- Club-foot. See Muscles; Dystrophies—Orthopædic Surgery—Spinal Cord; Hereditary Ataxia.
- Club-hand. See Orthopædic Surgery.
- Coal-gas Poisoning. See Sodium; Antidotal Uses.
- Coal-miners' Disease. See Pneumonokoniosis.
- Coal-oil. See Petroleum.
- Coal-tar. See Antipyrine—Naphthalin—Pentane—Phenacetin—Phenic (Carbolic) Acid—Pyridin.
- Coal-tar Creasote. See Phenic (Carbolic) Acid.
- Coast Fever. See Malarial Fevers.
- Cobalt Yellow. See Nitrites.
- Coca. See Erythroxylon Coca and Cocaine.
- Cocaine. See Erythroxylon Coca and Cocaine—Ether; Physiological Action.
- Cocaine Cantharidate. See Cantharides.
- Cocaine Eruption. See Erythema Medicamentosum.

Brain — Uræmia — Vascular Diseases of Brain;

- Coma.
Embolism—Vascular System; Vascular Obstruction; Fat-embolism—Wounds of Head; Compression of Brain—Wounds of Head; Diseases Involving Skull—Wounds of Head; Extradural Hemorrhage—Wounds of Head; Wounds of Brain—Wounds (Septic) and Gangrene; Pyæmia—Wounds (Septic) and Gangrene; Septicæmia.
- Coma, Diabetic. See Diabetic Coma (Index).
- Coma Vigil. See Typhoid Fever.
- Combined Postero-lateral Sclerosis. See Spinal Cord; Ataxic Paraplegia.
- Combustion, Spontaneous. See Alcoholism, Combustion During.
- Comedo. See Acne—Pix Liquida—Surgical Diseases of Skin and its Appendages; Milium.
- Comitant Strabismus. See Strabismus.
- Comma Bacillus. See Cholera Asiatica.
- Common Frankincense. See Turpentine.
- Compensatory Emphysema. See Pulmonary Emphysema.
- Compound Cathartic Pills. See Colocynth.
- Compound Effervescent Powder. See Potassium.
- Compound Fractures. See Fractures.
- Compound Jalap Powder. See Potassium.
- Compound Licorice Powder. See Licorice.
- Compressed Air. See Asthma.
- Compresses, Hot. See Palpebræ; Injuries.
- Compresses, Ice. See Ice Compresses (Index).
- Compression of Brain. See Brain, Compression (Index).
- Compression, Treatment by. See Aneurism—Elephantiasis.
- Concealed Pregnancy. See Pregnancy, Disorders of.
- Conchiline. See Cinchona.
- Concomitant Strabismus. See Strabismus.
- Concretions, Intestinal. See Obstruction, Intestinal.
- Concussion, Cerebral. See Head, Injuries of.
- Concussion of Brain. See Glycosuria—Head, Injuries of—Wounds of Head; Extradural Hemorrhage—Wounds of Head; Wounds of Brain.
- Condurango. See Stomach, Diseases of; Carcinoma.
- Condyloma. See Acetic Acid—Surgical Diseases of the Skin and its Appendages; Verruca—Syphilis; General Infection—Tumors.
- Condyloma, Syphilitic. See Syphilitic Condylomata (Index).
- Condylomatous Growths. See Nitric Acid.
- Confusion, Acute Hallucinatory. See Insanity; Acute Confusional.
- Congenital Closure of Oesophagus. See Stomach; Surgery of; Gastrostomy.
- Congenital Dislocations. See Dislocations.
- Congenital Syphilis. See Syphilis.
- Congenital Tuberculosis. See Tuberculosis of Lungs.
- Congestion, Acute Pulmonary. See Vascular System; Vascular Obstruction; Fat-embolism.
- Congestion, Acute Renal. See Vascular System; Vascular Obstruction; Fat-embolism.
- Congestion, Cerebral. See Cerebral Congestion (Index).
- Congestion, Hypostatic. See Pulmonary Circulation; Pulmonary Congestion.
- Congestion, Kidney. See Quinine; Contra-indications.
- Congestion of Liver. See Liver.
- Congestion of Lungs. See Lungs, Congestion of (Index)—Pulmonary Congestion (Index).
- Congestion of Lungs, Passive. See Valvular Diseases of Heart; Mitral Stenosis.
- Congestion of Ovary. See Uterine Adnexa; Acquired Malformations of Ovaries.
- Congestion, Ovarian. See Uterine Adnexa; Acquired Malformations of Ovaries.
- Congestion, Pulmonary. See Pulmonary Congestion (Index).
- Congestive Fever. See Malarial Fevers.
- Coniine. See Toxic Foods; Ptomaines.
- Conine Bromohydrate. See Bromides.
- Conjunctiva, Chancre of. See Conjunctiva; Syphilis.
- CONJUNCTIVA, DISEASES OF THE (*General Subject*).
- Conjunctiva, Herpes of. See Herpes.
- Conjunctiva, Lupus of. See Conjunctiva; Tubercular Disease.
- Conjunctiva, Papillomata of. See Conjunctiva; Tumors.
- Conjunctiva, Polyp of. See Conjunctiva; Tumors.
- Conjunctiva, Tubercular Diseases of. See Conjunctiva.
- Conjunctival Chemosis. See Conjunctiva; Miscellaneous Disorders.
- Conjunctival Ecchymoses. See Conjunctiva.
- Conjunctival Hyperæmia. See Conjunctiva.
- Conjunctivitis. See Adenitis—Animal Extracts; Supra-renal—Atropine—Boric Acid—Conjunctiva—Iritis—Keratitis—Measles—Mercury; Chlorides—Mercury; Oxides—Methyl-blue—Phenic (Carbolic) Acid; Phenosalyl—Plague—Resorcin—Resorcin; Hydroquinone—Silver; Ophthalmic Disorders—Zinc; Catarrhal Disorders.
- Conjunctivitis, Acute. See Silver; Protargol.
- Conjunctivitis, Catarrhal. See Conjunctiva—Silver; Argonin.
- Conjunctivitis, Chronic. See Hyperopia.
- Conjunctivitis, Croupous. See Conjunctiva.
- Conjunctivitis, Diphtheritic. See Conjunctivitis; Croupous.
- Conjunctivitis, Granular. See Conjunctiva—Copper—Cornea, Opacities of—Jequirity.
- Conjunctivitis, Pteryctenar. See Conjunctiva—Cornea, Opacities of—Keratitis; Pteryctenar—Mercury; Chlorides—Palpebræ; Eczema.
- Conjunctivitis, Purulent. See Silver; Argonin.
- Conjunctivitis, Strumous. See Conjunctiva.
- Conjunctivitis, Ulcerative. See Specific Infectious Fevers; Relapsing.
- Connective-Tissue Tumors. See Tumors.
- Consanguinity. See Deaf-mutism.
- Consecutive Dementia. See Insanity.
- Constant Strabismus. See Strabismus.
- CONSTIPATION (*General Subject*). See Aloes—Belladonna—Boric Acid—Colchicum—Colocynth—Glycerin—Hydrastis—Hypnotism—Hysteria; Visceral and Vasomotor Disturbances—Ipecac—Licorice—Lobelia—Magnesia—Nux Vomica—Obstruction, Intestinal—Olive-oil—Ox-gall—Oxygen; Oxygen-water—Physostigma—Podophyllum—Potassium; Purgatives—Pregnancy, Disorders of—Rhubarb—Sodium; Gastro-Intestinal Disorders—Specific Infectious Fevers; Malta—Spinal Cord; Myelitis—Strychnine; Gastro-Intestinal Disorders—Thiol.
- Constipation, Infantile. See Nursing and Artificial Feeding; Other Substances than Milk—Nursing and Artificial Feeding; Special Modifications—Nursing; Unsuccessful Nursing.
- Constitutive Lymphatic. See Status Lymphaticus.
- Constitutional Disorders. See Strontium.
- Constitutional Effects of Cold. See Surgical Diseases of the Skin and its Appendages.
- Constriction, Aortic. See Vasculo-Cardiac Neuroses; Irregular Heart.
- Consumption. See Pulmonary Tuberculosis (Index).
- Continued Fever. See Malarial Fevers; Malignant Tertian Fever—Meningitis; Lento-meningitis.
- Contracted Pupils. See Pupils, Contracted (Index).
- Contraction, Muscular. See Toxic Foods; Phalline Poisoning.
- Contraction of Muscles, Tonic. See Sulphur; Poisoning.
- Contraction of Oesophagus, Cicatricial. See Stomach, Surgery of; Gastrostomy.
- Contraction of Tendon and Fascia. See Tendons.
- Contracture. See Cerebral Hemorrhage; Peripheral Troubles—Hysteria—Spinal Cord; Ataxic Paraplegia—Spinal Cord; Myelitis—Toxic Foods; Grain Poisoning.
- Contracture, Dupuytren's. See Tendons; Contraction of Tendons.
- Contracture, Muscular. See Muscles; Surgical Diseases.
- Contracture, Spastic. See Spinal Cord; Primary Lateral Sclerosis.
- Contrexéville Water. See Diabetes Mellitus—Gout.
- Contusion. See Abdomen—Cajuput-oil—Dislocations—Erythema Nodosum—Fractures.
- Contusion, Cerebral. See Head, Injuries of.
- Contusion of Arteries. See Vascular System; Injuries of Arteries.
- Contusion of Chest. See Wounds and Injuries of Thorax; Mural Injuries.
- Contusion of Nail. See Nails, Diseases and Injuries.
- Contusion of Scalp. See Wounds of Head; Scalp.
- Convallamarin. See Convallaria Majalis.
- CONVALLARIA MAJALIS (*General Subject*).
- Convallarin. See Convallaria Majalis.

- Convergent Strabismus. See Strabismus.
 Convergent Strabismus, Latent. See Strabismus; Latent.
 Convolvulin. See Jalap.
 Convulsions. See Aconite—Bright's Disease; Acute—Bright's Disease; Exudative Chronic—Bright's Disease; Non-exudative Chronic—Bromides—Chorea; Convulsive and Paroxysmal Maladies—Cerebral Hemorrhage; Convulsions; Twitchings—Chloral—Chloroform—Copper; Poisoning—Diphtheria; Pharyngeal; Severe—Encephalitis; Acute Diffuse Suppurative—Encephalitis; Acute Non-suppurative—Epilepsy—Erysipelas—Ether—Gold; Poisoning—Hydrocephalus; Acute—Hydrocephalus; Chronic—Hysteria—Infants, Diarrhœal Diseases of; Acute Ileocolitis—Infants, Diarrhœal Diseases of; Inflammatory Diarrhœas—Insanity—Insanity; Syphilitic—Insanity; Uræmic—Insolation; Heat-apoplexy—Internal Ear; Tuning-fork Tests—Jaundice; Obstructive—Jaundice; Toxæmia—Jequiritv; Poisoning—Lead; Chronic Poisoning—Lobelia—Malarial Fevers; Pernicious—Measles—Meningitis; Acute Leptomeningitis—Meningitis; Chronic Leptomeningitis (Cerebral)—Meningitis; External Pachymeningitis (Cerebral)—Milk-sickness—Musk—Nitrobenzene; Poisoning—Penis and Testicles; Phimosi—Pertussis—Phenic (Carbolic) Acid; Poisoning—Phosphorus; Poisoning—Pleurisy; Acute—Pneumonia, Catarrhal—Pneumonia, Lobar—Podophyllum; Poisoning—Pulmonary Circulation; Embolism—Quebracho; Poisoning—Resorcin; Poisoning—Scarlet Fever; Malignant—Scorbutus—Silver; Poisoning; Acute—Strychnine; Poisoning—Toxic Foods; Grain Poisoning—Toxic Foods; Muscarine Poisoning—Toxic Foods; Phalline Poisoning—Tumors of Brain—Typhoid Fever—Uræmia—Veratrum Viride; Poisoning—Wounds of Head; Diseases Involving Skull.
 Convulsions, Epileptiform. See Ergot; Chronic Poisoning—Erythroxylon Coca and Cocaine; Acute Poisoning—Insanity; General Paresis—Meningitis; Internal Pachymeningitis (Cerebral).
 Convulsions, Epileptoid. See Aconite; Poisoning.
 Convulsions in Children. See Spasms and Convulsions in Children—Specific Infectious Fevers; Dengue—Specific Infectious Fevers; Relapsing—Spinal Cord; Myelitis—Spinal Cord; Poliomyelitis.
 Convulsions, Infantile. See Infantile Convulsions (Index).
 Convulsions, Puerperal. See Eclampsia—Paraldehyde.
 Convulsions, Spinal. See Spinal Convulsions (Index).
 Convulsions, Tetanic. See Tetanic Convulsions (Index).
 Convulsions, Uræmic. See Bright's Disease—Epilepsy.
 Convulsive Movements. See Tumors of Brain.
 COPAIBA (*General Subject*). See Nursing; Breast-milk.
 Copaiba Eruption. See Dermatitis Medicamentosa—Erythema Scarlatiniform—Rubella.
 Copalva. See Copaiba.
 COPPER (*General Subject*).
 Coprinus Comatus. See Toxic Foods; Poisonous Mushrooms.
 Cor Bovinum. See Bright's Disease; Chronic—Hypertrophy of the Heart.
 Corectopia. See Iris, Ciliary Body, and Choroid; Anomalies of Iris and Choroid.
 Corn, Indian. See Corn-ergot.
 Corn Poisoning. See Toxic Foods; Grain Poisoning.
 CORN-ERGOT AND CORN-SILK (*General Subject*).
 Corn-shut. See Corn-ergot.
 Cornea, Burns of. See Cornea.
 Cornea, Carcinoma of. See Cornea; Tumors.
 CORNEA, DISORDERS OF (*General Subject*). See Astigmatism—Keratitis.
 Cornea, Foreign Bodies in. See Cornea.
 Cornea, Hemorrhage into. See Cornea, Opacities of.
 Cornea, Herpes of. See Herpes.
 Cornea, Inflammation of. See Keratitis (Index).
 Cornea, Lesions of. See Resorcin; Resorcinn-phthalein.
 Cornea, Necrosis of. See Typhoid Fever.
 Cornea, Sarcoma of. See Cornea; Tumors.
 Cornea, Strumous Ulcers of. See Atropine; Disorders of Eye.
 Cornea, Tumors of. See Cornea.
 Cornea, Wounds of. See Resorcin.
 Corneal Carcinoma. See Cornea; Tumors.
 Corneal Incisions. See Astigmatism; Regular.
 Corneal Opacities. See Copper; Eye Diseases—Cornea—Keratitis—Mercury; Oxides—Methyl-blue.
 Corneal Staphyloma. See Cornea, Opacities of.
 Corneal Ulceration. See Aristol; Diseases of Eye—Conjunctiva; Catarrhal Conjunctivitis—Conjunctiva; Diphtheritic Conjunctivitis—Conjunctiva; Granular Conjunctivitis—Conjunctiva; Purulent Conjunctivitis—Cornea—Exophthalmic Goitre—Formaldehyde; Ophthalmic Disorders—Iodine; Aristol—Keratitis—Mercury; Oxides—Methyl-blue—Physostigma; Ophthalmic Disorders—Silver; Ophthalmic Disorders—Tumors of Brain; Tumors of Pons.
 Cornification of the Skin. See Surgical Diseases of the Skin and its Appendages; Keratosis Senilis.
 Cornmeal-Bread Poisoning. See Toxic Foods; Grain Poisoning.
 Corns. See Acetic Acid—Chloral; Skin Diseases and Neoplasms—Copper; Skin Diseases—Potassium; Caustics—Salicylic Acid—Surgical Diseases of the Skin and its Appendages; Clavus—Tumors.
 Cornutin. See Ergot—Toxic Foods; Grain Poisoning.
 Corona Veneris. See Syphilis; General Infection.
 Corpora Quadrigenina, Tumors of. See Tumors of Brain.
 Corpulency, General. See Fatty Heart and Obesity.
 Corpus Callosum, Tumors of. See Tumors of Brain.
 Corpus Luteum, Cysts of. See Uterine Adnexa; Tumors of Ovaries.
 "Corrigan" Pulse. See Valvular Diseases of Heart; Aortic Regurgitation.
 Corrosive Sublimate. See Mercury; Chlorides.
 Corset-liver. See Liver, Diseases of.
 Coryza. See Acetic Acid; Diseases of Nose and Throat—Aconite; Disorders of Respiratory Tract—Alum; Laryngology—Ammonium; Carbonate—Belladonna; Disorders of Air-passages—Camphor; Febrile and Infectious Diseases—Erythroxylon Coca and Cocaine; Topical Administration—Glycerin—Hamamelis; Astringent—Infuenza—Iodine; Iodism—Iron; Hemorrhage—Jaborandi; Acute Congestion—Measles—Menthol; Naso-laryngeal Disorders—Middle Ear; Acute Catarrhal Otitis—Naphthalin; Naphthol-camphor—Nasal Cavities; Acute Coryza of Infants—Nasal Cavities; Acute Rhinitis—Nasal Cavities; Purulent Rhinitis—Phenic (Carbolic) Acid; Respiratory Disorders—Salol—Sodium; Laryngological Disorders.
 Cosmetics. See Lead; Chronic Poisoning.
 Costal Cartilages, Dislocations of. See Dislocations.
 Costal Cartilages, Fracture of. See Fractures.
 Costal Neuralgia. See Miliary Fever; Miliaris Alba.
 Costiveness. See Constipation.
 Cotton-leaves. See Cotton-plant.
 COTTON-PLANT (*General Subject*).
 Cotton-root. See Cotton-plant.
 Cotton-seed Oil. See Cotton-plant.
 Cough. See Mustard; Disorders of Respiratory Tract—Paraldehyde—Potassium; Cyanide—Salicylic Acid; Theobromine and Sodium Salicylate.
 Cough, Bronchial. See Lobelia.
 Cough, Hacking. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
 Cough, Irritative. See Salicylic Acid; Antispasmin.
 Cough, Nervous. See Hydrocyanic Acid; Spasmodic Disorders—Hyoscyamus—Zinc; Nervous Disorders.
 Cough of Phthisis. See Phthisis, Cough of (Index).
 Cough, Spasmodic. See Gelsemium; Spasmodic Disorders—Grindelia.
 Cough, Winter. See Ipecac; Disorders of Respiratory Tract—Jaborandi; Chronic Affections—Nux Vomica; Pulmonary Disorders—Strychnine; Pulmonary Disorders.
 Cough-lozenges, Wistar's. See Wistar's Cough-lozenges (Index).
 Counter-irritant. See Alcohol—Iodine and Derivatives—Mustard—Petroleum.
 Counter-irritation. See Turpentine.
 "Cowardice." See Vasculo-Cardiac Neuroses; Palpitation.
 Cowhage Eruption. See Dermatitis Venenata.

- Cowper's Glands, Inflammation of. See Urinary System, Surgical Diseases of; Acute Prostatitis.
- Cow-pox. See Vaccinia—Variola; Vaccinia.
- Coxa Vara. See Hip-joint Disease—Orthopædic Surgery.
- Coxalgia, Sciatic. See Guaiacol; Painful Disorders.
- Crab Poisoning. See Toxic Foods; Shell-fish Poisoning.
- Cracked Nipples. See Nipples, Cracked (Index).
- Cracked-Pot Resonance. See Tuberculosis of Lungs.
- Cramps. See Exophthalmic Goitre—Gold; Poisoning—Insolation; Thermic Fever—Mercury; Poisoning—Muscles; Myotonia—Toxic Foods; Grain Poisoning—Toxic Foods; Muscarine Poisoning—Tremors; Paralysis Agitans.
- Cramps in Abdomen. See Toxic Foods; Phalline Poisoning.
- Cramps in Calves of Legs. See Toxic Foods; Meat Poisoning.
- Cramps in Extremities. See Copper; Poisoning—Diabetes Mellitus—Gout; Acute—Malarial Fevers; Pernicious Cholericform Type—Male Fern; Poisoning.
- Cramps in Lower Limbs. See Toxic Foods; Phalline Poisoning.
- Cramps, Intermittent Tonic. See Spasms in Children.
- Cramps, Muscular. See Muscular Cramps (Index).
- Cramps, Nocturnal. See Sulphonal.
- Cramps of Leg-muscles. See Zinc; Poisoning.
- Cramps, Pyloric. See Stomach, Diseases of; Carcinoma.
- Cranial Aspiration. See Hydrocephalus; Chronic.
- Cranial Bones, Caries of. See Wounds of Head; Diseases Involving Skull.
- Cranial Bones, Inflammation of. See Wounds of Head; Diseases Involving Skull.
- Cranial Bones, Necrosis of. See Wounds of Head; Diseases Involving Skull.
- Cranial Bones, Ostitis of. See Wounds of Head; Diseases Involving Skull.
- Cranial Bones, Periostitis of. See Wounds of Head; Diseases Involving Skull.
- Cranial Nerves, Paralysis of. See Hydrocephalus; Chronic.
- Cranial Paralysis. See Cerebral Hæmorrhage; Paralysis.
- Cranial Traumatism. See Insanity; Insanity from Traumatism.
- Cranietomy. See Insanity; Idiocy.
- Cranioclast to Breech. See Parturition, Abnormal.
- Cranioclast to Head. See Parturition, Abnormal.
- Craniotabes. See Osseous System; Rickets.
- Cranks. See Insanity; Paranoia.
- Cream of Tartar. See Potassium.
- Cream Poisoning. See Toxic Foods.
- Creasol. See Creasote.
- CREASOTE (*General Subject*). See Bronchiectasis—Guaiacol—Tuberculosis of Lungs; Semispecifics.
- Creasote, Coal-tar. See Phenic (Carbolic) Acid.
- Creasote Enema. See Pneumonia; Catarrhal.
- Creasote Eruption. See Dermatitis Venenata.
- Creasotinic Acid. See Creasote.
- Crédé, Unguentum. See Silver; Unofficial Salts.
- Crepitus. See Fractures.
- Cresalol. See Creasote.
- Crescents in Blood. See Malarial Fevers.
- Cresol. See Creasote—Phenic (Carbolic) Acid.
- Cresol Salicylate. See Salicylic Acid.
- Cresols. See Pix Liquida; Lysol.
- Cretinism. See Animal Extracts; Thyroid—Infantile Myxœdema.
- Cretinism, Sporadic. See Myxœdema.
- Cretinoid Change. See Myxœdema.
- Cretins. See Infantile Myxœdema.
- Crises. See Locomotor Ataxia; Tabetic Crises.
- Crises, Gastric. See Gastric Crises (Index).
- Crises, Tabetic. See Locomotor Ataxia.
- Crossed Diplopia. See Strabismus.
- Crossed Paralysis. See Paralysis, Crossed (Index).
- Croton-chloral-hydrate. See Chloral.
- CROUP (*General Subject*). See Alum; Croup—Apomorphine; Croup—Asthma; Croup and other Laryngeal Disorders—Belladonna; Spasmodic Disorders—Copper; Convulsive Diseases—Jaborandi; Chronic Affections—Measles—Mercury; Chlorides—Oxygen—Ozone—Petroleum—Spine, Diseases of; Tuberculosis—Sulphur; Respiratory Disorders—Tracheo-Laryngeal Operations; Tracheotomy.
- Croup, False. See Naso-pharynx; Adenoids.
- Croup, Membranous. See Croup—Intubation—Ipecac—Pepsin; Surgical Solvent.
- Croup, Pseudomembranous. See Croup; Catarrhal.
- Croupous Conjunctivitis. See Conjunctiva.
- Croupous Pneumonia. See Pneumonia, Croupous (Index).
- Croupous Rhinitis. See Nasal Cavities.
- Croupous Stomatitis. See Mouth.
- Croupous Tonsillitis. See Tonsils; Tonsillitis.
- Crural Monoplegia. See Vascular Diseases of Brain; Branches of Precerebral.
- Crus, Tumors of the. See Tumors of Brain.
- Crustaceous Chancre. See Syphilis; Initial Lesion.
- Crustaceous Syphilide. See Syphilis; Syphilides.
- Crutch Paralysis. See Nerves, Peripheral; Simple Neuritis.
- Cryptoglioma. See Optic Nerve and Retina; Glioma.
- Cryptopine. See Opium.
- Cryptorchidism. See Penis and Scrotum; Undescended Testicle.
- Crystalline Lens, Removal of. See Myopia.
- CUBBB (*General Subject*).
- Cubeb Eruption. See Dermatitis Medicamentosa.
- Cubic Acid. See Cubeb.
- Cubeb. See Cubeb.
- Cubic Nitre. See Sodium.
- Cucumber, Squirting. See Elaterium.
- Cuirass. See Hip-joint Disease—Spine, Diseases of; Tuberculosis.
- Cupping. See Bright's Disease; Acute—Meningitis; Leptomeningitis.
- Cupping of Optic Disk. See Tension of Eyeball; Glaucoma.
- Cupratin. See Copper.
- Cuprea Bark. See Cinchona.
- Cuprein. See Copper.
- Cupreine. See Cinchona.
- CURARA (*General Subject*).
- Curare. See Alkaloids—Curara.
- Curarine. See Curara.
- Curettage. See Abortion—Adenitis; Acute—Adenitis; Chronic—Dysmenorrhœa—Endometritis—Erythroxylon Coca and Cocaine; Topical Administration—Metritis—Menopause—Tumors of Rectum and Anus; Malignant Growths—Uterus; Carcinoma of Corpus Uteri—Uterus; Myoma.
- Curette. See Tuberculosis of Larynx.
- Curette, Gottstein's. See Naso-pharynx; Adenoids.
- Curine. See Curara.
- Curschmann's Spirals. See Asthma—Bronchitis; Fibrinous.
- Curvature, Lateral. See Spine, Diseases of; Tuberculosis.
- Curvature of Spine. See Spine, Curvature of (Index).
- Curvature, Rotary Lateral. See Spine, Diseases of; Scoliosis.
- Cutaneous Disorders. See Silver; Ophthalmic Disorders—Sodium; Gastro-Intestinal Disorders—Strontium—Sulphur—Zinc.
- Cutaneous Hyperæmia. See Thyroid Gland; Thyroid Fever.
- Cutaneous Myxomata. See Tumors; Connective Tissue.
- Cutol. See Aluminium.
- Cyanhydric Acid. See Hydrocyanic Acid.
- Cyanosis. See Acetanilid; Poisoning—Antipyrine; Poisoning—Asthma—Chloroform; Collapse—Cholera Asiatica—Croup; Catarrhal—Dilatation of the Heart—Diphtheria; Laryngeal—Diphtheria; Septic Pharyngeal—Eclampsia—Ether; Untoward Effects—Fatty Heart and Obesity—Guaiacol; Poisoning—Hydrocyanic Acid; Poisoning—Insolation—Intubation in Diphtheria—Iodine; Poisoning—Jalap—Mediastinum; Tumors—Myocarditis; Acute—Nitrobenzene; Poisoning—Nitrous Oxide; Physiological Action—Opium; Poisoning—Oxygen; Inhalation—Phenacetin; Poisoning—Pleura; Hydrothorax—Pleura; Pneumothorax—Pneumonia, Catarrhal—Pneumonia, Lobar—Potassium; Chlorate; Poisoning—Pulmonary Circulation; Atelectasis—Pulmonary Circulation; (Edema—Pulmonary Emphysema; Vascular—Respiratory Organs, Neuroses of; Laryngismus Stridulus—Spasms in Children; Tetany—Sulphonal; Poisoning—Thyroid Gland; Thyroiditis—Toxic Foods; Phalline Poisoning—Tumors of Larynx and Lungs; Carcinoma of Lungs—Valvular Diseases of Heart; Aortic Regurgitation—Valvular Diseases of Heart; Mitral

- Regurgitation—Valvular Diseases of Heart; Pulmonary Stenosis—Valvular Diseases of Heart; Tricuspid Regurgitation—Valvular Diseases of Heart; Tricuspid Stenosis—Vascular System; Vascular Obstruction; Fat-embolism—Vascular System; Vascular Obstruction; Thrombosis.
- Cyanosis of Arm. See Pseudoleukemia.
- Cyanotic Atrophy of Liver. See Liver, Passive Congestion.
- Cyanotic Discoloration. See Spinal Cord; Syringomyelia.
- Cyclitis. See Iris, Ciliary Body, and Choroid; Iritis, etc.
- Cycloplegic. See Homatropine.
- Cynorexia. See Stomach, Diseases of; Functional; Bulimia.
- Cystic Kidney. See Hydronephrosis.
- Cystic Ovary. See Ovary, Cystic (Index).
- Cystic Tumors. See Surgical Diseases of the Skin and its Appendages; Sebaceous Cysts.
- Cystic Tumors of Ovary. See Uterine Adnexa; Tumors of Ovaries.
- Cystic Tumors, Rupture of. See Uterine Adnexa; Tumors of Ovaries.
- Cysticercus. See Male Fern.
- Cysticercus Cellulose. See Parasites; Tape-worm.
- Cysticercus Cyst, Orbital. See Orbit; Tumors.
- Cysticercus Racemosus. See Parasites; Tape-worm; Tania Solium.
- Cysticercus, Subconjunctival. See Conjunctiva; Tumors.
- Cystinuria. See Rheumatism, Acute.
- CYSTITIS (General Subject).** See Ammonium Chloride—Antipyrine; Local Use—Belladonna; Miscellaneous—Benzoic Acid—Boric Acid; Ammonium Borate—Camphor; Camphoric Acid—Cantharides; Cystic Maladies—Copper; Genito-Urinary Diseases—Creasote—Diabetes Mellitus; Complications; Urinary—Eucalyptus; Genito-Urinary Disorders—Grindelia—Ichthyol; Genito-Urinary Disorders—Indicanuria—Juniper; Genito-Urinary Disorders—Linum—Lithium—Naphthalin; Urinary Disorders—Nitric Acid; Local Uses—Orthoform—Ozone—Pix Liquida; Catarrhal Disorders—Potassium; Antacids—Pregnancy, Disorders of—Quinine; Antiseptic—Quinine; Contra-indications—Resorcin—Rheumatism; Acute—Salicylic Acid; Bismuth Salicylate—Salicylic Acid; Naphthol Salicylate—Salol—Sodium; Genito-Urinary Disorders—Typhoid Fever—Urinary System, Surgical Diseases of; Hypertrophy of Prostate—Urinary System, Diseases of; Pyelitis—Urinary System, Surgical Diseases of; Acute Prostatitis—Urinary System, Surgical Diseases of; Chronic Prostatitis—Urinary System, Surgical Diseases of; Vesical Calculus—Urinary System, Surgical Diseases of; Vesical Tuberculosis—Uterine Adnexa; Tumors of Ovaries—Uterus; Carcinoma of Cervix Uteri—Uterus; Prolapse.
- Cystitis, Gonorrhœal. See Alchol.
- Cystitis, Purulent. See Phenic (Carbolic) Acid; Phenosalyl.
- Cystitis, Tubercular. See Erythroxylon Coca; Genito-Urinary—Formaldehyde; Vesical Disorders—Guaiacol; Tuberculosis.
- Cystocarcinoma, Papillary. See Uterine Adnexa; Tumors of Ovaries.
- Cystocele. See Uterus; Prolapse—Vagino-Perineal Injuries.
- Cystoma, Colloid Papillary. See Uterine Adnexa; Tumors of Ovaries.
- Cystoma of Rectum. See Tumors of Rectum and Anus; Benign.
- Cystoma of Tongue. See Tongue; Tumors.
- Cystosarcoma of the Liver. See Liver; Tumors.
- Cystotomy. See Urinary System, Surgical Diseases of; Hypertrophy of Prostate.
- Cysts. See Hernia; Femoral—Tumors—Tumors; Lipomata.
- Cysts, Chyle-. See Tumors; Cysts.
- Cysts, Echinococcic. See Echinococcic Cyst (Index).
- Cysts, Gland-. See Tumors; Cysts.
- Cysts, Hydatid. See Hydatid Cyst (Index).
- Cysts, Implantation. See Tumors; Dermoids.
- Cysts, Labial. See Hernia; Rare Forms; Perineal.
- Cysts, Lymphatic. See Tumors; Connective Tissue.
- Cysts, Nasal. See Nasal Cavities; Tumors.
- Cysts, Neural. See Tumors; Cysts.
- Cysts of Breast. See Tumors of Breast.
- Cysts of Broad Ligament. See Uterine Adnexa; Tumors of Ovaries.
- Cysts of Conjunctiva. See Conjunctiva; Tumors.
- Cysts of Corpus Luteum. See Uterine Adnexa; Tumors of Ovaries.
- Cysts of Ear. See External Ear.
- Cysts of Fallopian Tubes. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Cysts of Iris. See Iris; Tumors.
- Cysts of Larynx. See Tumors of Larynx and Lung; Larynx.
- Cysts of Ovary. See Uterine Adnexa; Inflammations of Ovary.
- Cysts of Ovary, Dermoid. See Uterine Adnexa; Tumors of Ovaries.
- Cysts of Ovary, Follicular. See Uterine Adnexa; Tumors of Ovaries.
- Cysts of Pancreas. See Pancreas, Cysts of (Index).
- Cysts of Pelvis, Echinococcic. See Syphilis; Period of Sequelæ.
- Cysts of Penis. See Penis and Testicles; Tumors.
- Cysts of Pharynx. See Tonsils; Tumors.
- Cysts of Prostate. See Urinary System, Surgical Diseases of; Tumors of Prostate.
- Cysts, of Rectum, Dermoid. See Rectum, Dermoid Cysts of (Index).
- Cysts of Salivary Glands. See Salivary Glands; Tumors.
- Cysts of Scalp. See Wounds of Head; Tumors of Scalp.
- Cysts of Spleen. See Spleen; Tumors.
- Cysts of Testicles. See Penis and Testicles; Tumors of Testicles.
- Cysts of Thyroid Gland. See Goitre.
- Cysts of Vagina. See Vagina; Herniæ.
- Cysts, Ovarian. See Cysts of Ovary (Index)—Ovarian Cysts (Index)—Uterine Adnexa; Tumors of Ovaries.
- Cysts, Parovarian. See Parovarian Cysts (Index).
- Cysts, Pseudo-. See Tumors; Cysts.
- Cysts, Renal. See Renal Cysts (Index).
- Cysts, Retention-. See Blepharitis—Tumors; Cysts.
- Cysts, Sebaceous. See Encephalocele—Surgical Diseases of the Skin and its Appendages—Encephalocele.
- Cysts, Tubo-Ovarian. See Tubo-Ovarian Cysts (Index).
- Cysts Tubulo-. See Tumors; Cysts.
- Cytissus Laburnum, Poisoning by. See Choluria.
- Czerny-Lembert Suture. See Stomach, Surgery of; Intestines; Enterorrhaphy.
- Czerny's Method. See Tendons; Wounds and Injuries.
- Dacryoadenitis. See Lacrymal Apparatus; Secretory Apparatus.
- Dacryocystitis. See Lacrymal Apparatus; Lacrymal Sac.
- Dacryops. See Lacrymal Apparatus; Secretory Apparatus—Tumors; Cysts.
- Dacryorrhœa. See Lacrymal Apparatus; Excretory Apparatus.
- "Daisy Powders." See Acetanilid; Dose.
- Dalby's Formula. See Magnesia; Antacid.
- "Dandruff." See Seborrhœa.
- Dandy Fever. See Specific Infectious Fevers; Dengue.
- D'Arsonval's Extract. See Animal Extracts; Brain.
- Davies's Hammock. See Spine, Diseases of; Tuberculosis.
- Day-blindness. See Optic Nerve and Retina; Retinitis.
- "Dead Finger." See Bright's Disease; Non-exudative Chronic.
- DEAF-MUTISM (General Subject).**
- Deafness. See Bright's Disease; Non-exudative; Chronic—Cantharides; Ear Diseases—Deaf-mutism—External Ear—Gout; Irregular—Hysteria; Special Sense-organs—Insanity; Idiocy—Internal Ear—Locomotor Ataxia; Special Senses—Middle Ear—Naso-pharynx; Adenoids—Parotitis; Infectious—Salicylic Acid; Poisoning—Thymol; Physiological Action—Tonsils; Hypertrophy—Typhoid Fever—Uremia—Wounds of Head; Diseases Involving Skull—Wounds of Head; Wounds of Brain.
- Deafness, Boiler-makers'. See Internal Ear; Occupation Deafness.
- Deafness, Occupation. See Internal Ear.
- Deafness, Word-. See Word-deafness (Index).

- Death-cup Mushroom. See Toxic Foods; Poisonous Mushrooms.
- Debility, General. See Quinine; Tonic.
- Debility, Myocardial. See Vasculo-Cardiac Neuroses; Irregular Heart.
- Decalcification of Teeth. See Picric Acid.
- Decalcified-Bone Plates, Senn's. See Stomach, Surgery of; Intestines; Anastomosis.
- Decapitation. See Parturition, Abnormal.
- Deciduoma Malignum. See Uterine Adnexa; Tumors of Fallopian Tubes—Uterus; Tumors.
- Decubitus. See Cerebral Hemorrhage.
- Deerberry. See Gaultheria.
- Deer-fly's Bite. See Wounds and Stings; Horse-fly.
- Defective Callous Formation after Fractures. See Sulphur; Respiratory Disorders.
- Defects of Vagina. See Vagina; Absence and Defects of Structure.
- Degenerates. See Insanity; Paranoia.
- Degeneration, Amyloid. See Amyloid Degeneration (Index).
- Dégénération Hémoglobinémiq. See Anæmia, Pernicious.
- Degeneration of Scars, Malignant. See Surgical Diseases of the Skin and its Appendages.
- Degeneration, Vascular. See Syphilis; Period of Sequelæ.
- Deglutition, Paralysis of Muscles of. See Nerves, Peripheral; Multiple Neuritis.
- Deglutition Pneumonia. See Pneumonia, Catarrhal.
- Delirifacient. See Atropine—Erythroxylon Coca and Cocaine—Homatropine—Hyoscyamus.
- Delirium. See Atropine; Poisoning—Belladonna; Poisoning—Bright's Disease—Cirrhosis of the Liver; Portal—Ergot; Poisoning—Erysipelas—Exophthalmic Goitre—Hyoscyamus; Treatment of Poisoning—Infants, Diarrheal Diseases of; Inflammatory—Influenza—Insanity; Acute Confusional—Insanity; Mania—Iodine; Iodoform—Jaundice; Obstructive—Jaundice; Toxæmia—Lead; Chronic Poisoning—Leukæmia; Acute—Liver; Acute Yellow Atrophy—Malarial Fevers; Pernicious—Meningitis—Miliary Fever—Myocarditis—Pempfigus; Vulgaris—Pericardium; Pericarditis—Phenacetin; Lactophenin—Phenacetin; Thymacetin—Phosphorus; Poisoning—Plague—Pneumonia, Catarrhal—Pneumonia, Lobar—Potassium; Poisoning—Scarlet Fever—Scorbutus—Silver; Poisoning; Acute—Specific Infectious Fevers; Dengue—Rheumatism; Acute—Salicylic Acid; Poisoning—Stomach, Diseases of; Phlegmonous Gastritis—Surgical Diseases; Traumatic Delirium—Thymol; Thymacetin—Toxic Foods; Grain Poisoning—Typhoid Fever—Typhus Fever—Uræmia—Urinary System, Diseases of; Pyelitis—Valerian—Valvular Diseases of Heart; Aortic Regurgitation—Varicella—Vascular System; Injuries of Blood-vessels: Hemorrhage—Vascular System; Vascular Obstruction; Patembolism—Wounds of Head; Abscess of Scalp—Wounds of Head; Compression of Brain—Wounds (Septic) and Gangrene; Pyæmia—Wounds (Septic) and Gangrene; Septicæmia.
- Delirium, Acute Alcoholic. See Alcoholism; Delirium Tremens.
- Delirium Cordis. See Vasculo-Cardiac Neuroses; Irregular Heart.
- Delirium, Grave. See Insanity; Acute Confusional.
- Delirium, Muttering. See Musk.
- Delirium, Traumatic. See Insanity; Post-febrile—Surgical Diseases.
- Delirium Tremens. See Alcoholism; Acute Alcoholic Delirium—Atropine; Insomnia—Camphor—Cannabis Indica—Chloral; Mental Diseases—Digitalis—Lupulus; Sedative—Paraldehyde—Pneumonia, Lobar—Quinine; Tonic—Surgical Diseases; Traumatic Delirium.
- Delphinine. See Toxic Foods; Ptomaines.
- Delusions. See Alcoholism—Cocainomania—Insanity—Malarial Fevers; Pernicious—Myxædema—Rabies—Typhoid Fever.
- Dementia. See Animal Extracts; Thyroid—Chloral; Mental Diseases—Insanity; Catatonia—Insanity; General Paresis; Insanity; Post-apoplectic—Toxic Foods; Grain Poisoning.
- Dementia, Consecutive. See Insanity; Mania.
- Dementia, Epileptic. See Insanity.
- Dementia, Paralytic. See Encephalitis; Chronic—Insanity; General Paresis.
- Dementia, Paretic. See Insanity; General Paresis—Tumors of Brain.
- Dementia, Senile. See Insanity.
- Demer's Formula. See Magnesia; Antacid.
- Demulcent. See Chaulmugra-oil—Licorice—Linum.
- Dendritic Keratitis. See Keratitis.
- Dengue. See Influenza—Specific Infectious Fevers—Yellow Fever.
- Denguis. See Specific Infectious Fevers; Dengue.
- Dental Caries. See Caries, Dental (Index).
- Dentition. See Erythema Symptomaticum.
- Deodorant. See Amyliform—Aristol—Hydrogen Dioxide—Manganese—Mustard—Ozone—Salicylic Acid—Salol.
- Depilatory. See Barium.
- Depletant. See Menthol.
- Depressant, Arterial. See Veratrum Viride; Physiological Action.
- Depressant, Cardiac. See Hydrocyanic Acid.
- Depressant, Spinal. See Veratrum Viride; Physiological Action.
- Depressed Fracture of Skull. See Skull, Depressed Fracture of (Index).
- Depressomotor. See Amyl-valerianate—Gelsemium—Grindelia—Lobelia—Nitrites—Nitroglycerin—Physostigma.
- DERMATITIS (*General Subject*). See Alumol; Dermatology—Atropine; Cutaneous Disorders—Eczema—Elephantiasis—Iodine; Iodism—Sodium; Cutaneous Disorders.
- Dermatitis Ambustionis Erythematosa. See Burns.
- Dermatitis Ambustionis Escharotica seu Gangrenosa. See Burns.
- Dermatitis Ambustionis Vesiculosa et Bullosa. See Burns.
- Dermatitis Exfoliativa. See Dermatitis.
- Dermatitis Gangrenosa. See Dermatitis.
- Dermatitis Herpetiformis. See Dermatitis—Erythema Multiforme—Thiol.
- Dermatitis Maligna. See Dermatitis.
- Dermatitis Medicamentosa. See Dermatitis.
- Dermatitis Multifforme. See Dermatitis Herpetiformis.
- Dermatitis, Myringo-. See Middle Ear; Acute Otitis.
- Dermatitis Traumatica. See Dermatitis.
- Dermatitis Veneata. See Dermatitis.
- Dermatography. See Exophthalmic Goitre.
- Dermatol. See Aiol—Bismuth; Dose—Mammary Gland; Nipples—Vascular System; Varix.
- Dermic Leukæmia. See Leukæmia; Lymphatic.
- Dermoid Cyst of Fallopian Tube. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Dermoid Cysts of Ovary. See Uterine Adnexa; Tumors of Ovaries.
- Dermoid Cysts of Peritoneum. See Peritoneum; Tumors.
- Dermoid Cysts of Rectum. See Rectum, Dermoid Cysts of (Index).
- Dermoid Cysts, Orbital. See Orbit; Tumors.
- Dermoid Patches. See Tumors; Dermoids.
- Dermoid Tumor of Abdominal Walls. See Uterine Adnexa; Tumors of Ovaries.
- Dermoids. See Tumors—Tumors; Odontomata.
- Dermoids of Conjunctiva. See Conjunctiva; Tumors.
- Dermoids of Testicles. See Penis and Testicles; Tumors of Testicle.
- Dermoids, Ovarian. See Tumors; Dermoids.
- Dermoids, Sequestration. See Tumors; Dermoids.
- Dermoids, Tubulo-. See Tumors; Dermoids.
- Desiccant. See Potassium; Soziodiolate.
- Després Method. See Nerves, Wounds and Injuries of.
- Desquamation. See Dermatitis Exfoliativa—Infantile Myxædema—Measles—Olive-oil—Scarlet Fever—Toxic Foods; Meat Poisoning—Typhoid Fever.
- Desquamation, Scaly. See Rubella.
- Desquamative Nephritis. See Strontium; Gastrointestinal Disorders.
- Detergent. See Alcohol—Boracic Acid—Potassium.
- Deviating Eye. See Strabismus.
- Dewee's Carminative. See Opium; Preparations.
- Dew's Method of Artificial Respiration. See Pulmonary Circulation; Atelectasis.
- Dextrin. See Malt.
- Dextrose in Urine. See Glycosuria.
- Diabète Bronzé. See Cirrhosis of the Liver; Portal.
- Diabetes, Bronzed. See Cirrhosis of the Liver; Portal.
- Diabetes Decipiens. See Diabetes Mellitus.
- Diabetes, Functional. See Ozone.

- DIABETES INSIPIDUS (*General Subject*). See Ergot—Jambul.
- Diabetes, Intermittent. See Diabetes Mellitus.
- DIABETES MELLITUS (*General Subject*). See Abortion—Acetonuria—Anorexia Nervosa—Antipyrine—Creasote—Glycerin—Glycosuria (Index)—Gout—Hydrogen Dioxide—Jambul—Lithium—Liver; Active Congestion—Manganese; Rheumatism—Pancreas; Chronic Pancreatitis—Pancreatin—Phenacetin; Dulcin—Phosphaturia—Piperazin—Rectum and Anus; Pruritus Ani—Sodium; Genito-Urinary Disorders—Strontium; Genito-Urinary Disorders—Sulphonal—Thymol—Typhoid Fever; Complications.
- Diabetes Pancreatic. See Diabetes Mellitus.
- Diabetes, Saccharin. See Diabetes Mellitus (Index)—Wounds of Head; Wounds of Brain.
- Diabetic Coma. See Acetonuria; Pathological Significance—Diabetes Mellitus.
- Diabetic Gangrene. See Wounds (Septic); Gangrene.
- Diabetic Neuritis. See Nerves, Peripheral; Multiple Neuritis.
- Diabetic Retinitis. See Optic Nerve and Retina; Retinitis.
- Diablito Colorado. See Wounds and Stings.
- Diabetic Acid. See Acetonuria.
- Diachylon Ointment. See Lead—Olive-oil.
- Diaphoresis. See Atropine; Excessive Diaphoresis—Phenacetin; Lactophenin; Poisoning—Phenacetin; Poisoning—Thymol; Physiological Action.
- Diaphoretic. See Acetic Acid—Aconite—Ammonium; Acetate—Apocynum Cannabinum—Arecoline—Asaprol—Chamomile—Ipecac—Jaborandi—Petroleum—Phenocoll—Potassium.
- Diaphragm, Paralysis of. See Beriberi—Diphtheria.
- Diaphragm, Spasm of. See Asthma.
- Diaphragm Phenomenon, Litten's. See Pleurisy; Chronic Dry.
- Diaphragmatic Button. See Pleurisy; Diaphragmatic.
- Diaphragmatic Hernia. See Hernia; Rare Forms—Pleura; Pneumothorax.
- Diaphragmatic Pleurisy. See Pleurisy.
- Diaphtherin. See Phenic (Carbolic) Acid; Derivatives.
- Diaphthol. See Phenic (Carbolic) Acid; Derivatives.
- Diarrhoea. See Airo—Arsenic; Physiological Action—Atropine; Collapse—Bismuth—Bright's Disease—Calcium—Camphor; Intestinal Fluxes—Cannabis Indica; Digestive Disorders—Cerium—Cholera Asiatica—Cholera Infantum—Colchicum; Physiological Action—Copper—Cotton-plant—Creasote; Gastro-Intestinal Disorders—Diphtheria; Complications—Dysentery—Ergot; Poisoning—Exophthalmic Goitre—Hamamelis; Astringent—Hydrochloric Acid; Gastric Disorders—Infants, Diarrhoeal Diseases of—Intestinal Fluxes (Index)—Intestines—Ipecac; Intestinal Disorders—Iodine; Rectal Injections—Kino—Krameria—Lead; Gastro-Intestinal Disorders—Lupulus; Stomachic—Magnesia—Malarial Fevers; Pernicious—Menthol; Gastro-Intestinal Disorders—Mercury; Chlorides—Mercury; Metallic—Mercury; Poisoning—Mouth; Gangrenous Stomatitis—Naphthalin—Nitric Acid; Internal Uses—Nux Vomica; Gastro-Intestinal Disorders—Opium; Papaverine—Pancreatin; Digestive Disorders—Parasites; Distoma Hepaticum—Parasites; Trichina—Pelletierine—Phenic (Carbolic) Acid—Phenic (Carbolic) Acid; Sulphocarbolates—Phosphorus; Poisoning—Picric Acid; Physiological Action—Pix Liquida; Catarrhal Disorders—Podophyllum—Potassium; Antacid—Potassium; Chlorate—Pyrogallol; Poisoning—Quassia—Quassia; Poisoning—Rectum and Anus; Pruritus Ani—Resorcin—Resorcin; Resorcin-salol—Rhubarb—Salicylic Acid; Ferric Salicylate—Salicylic Acid; Guaiacol Salicylate—Salicylic Acid; Salacetol—Salicylic Acid; Salicyl-resorcin—Salol—Silver; Silver Chloride—Spinal Cord; Poliomyelitis—Status Lymphaticus; Lymphangitis—Stomach, Diseases of; Acute Gastritis—Stomach, Diseases of; Phlegmonous Gastritis—Sulphur; Gastro-Intestinal Diseases—Suprarenal Capsules; Tumors—Surgical Diseases; Secondary Wound Fever—Thymol; Physiological Action—Toxic Foods; Grain Poisoning—Toxic Foods; Meat Poisoning—Toxic Foods; Muscarine Poisoning—Toxic Foods; Phalline Poisoning—Tumors; Paralysis Agitans—Tumors of Rectum and Anus; Benign—Tumors of Rectum and Anus; Malignant Growths—Typhoid Fever—Typhus Fever—Uraemia—Urinary System, Diseases of; Amyloid Kidney—Uterine Adnexa; Tumors of Ovaries—Veratrum Viride; Poisoning—Wounds (Septic) and Gangrene; Sapræmia—Wounds (Septic) and Gangrene; Septicæmia—Zinc; Gastro-Intestinal Disorders—Zinc; Poisoning.
- Diarrhoea, Bloody. See Stomach, Surgery of; Intestines; Thrombosis.
- Diarrhoea, Choleraic. See Cholera Morbus.
- Diarrhoea, Chronic. See Salicylic Acid; Camphor Salicylate.
- Diarrhoea, Cochín-China. See Dysentery.
- Diarrhoea, Epidemic. See Strychnine; Gastro-Intestinal Disorders.
- Diarrhoea, Infantile. See Arsenic—Dysentery; Catarrhal—Infants, Diarrhoeal Diseases of (Index)—Jambul—Magnesia; Antacid—Mercury; Chlorides—Mercury; Metallic—Naphthalin; Benzonaphthol—Nursing and Artificial Feeding; Special Modifications—Nursing; Unsuccessful—Pepsin—Thymol.
- Diarrhoea of Infants, Summer. See Cholera Infantum—Infants, Diarrhoeal Diseases of (Index).
- Diarrhoea of Phthisis. See Salicylic Acid; Bismuth Salicylate.
- Diarrhoea, Summer. See Cholera Morbus.
- Diarrhoea, Tubular. See Intestines; Colitis; Mucous.
- Diarrhoeal Diseases of Infants. See Infants, Diarrhoeal Diseases of (Index).
- Diastase. See Malt—Pancreatin.
- Diastatic Extract of Malt. See Malt.
- Diastasis. See Dislocations.
- Diastolic Murmur. See Murmur, Diastolic (Index).
- Diazo-reaction of Ehrlich. See Typhoid Fever.
- Dietary, Banting's System of. See Fatty Heart.
- Dietetics, Trochowonick. See Parturition, Abnormal.
- Di-ethylene-diamin. See Piperazin.
- Diffuse Sclerosis of Cerebrum. See Tumors of Brain.
- Digestant. See Malt—Pancreatin—Pepsin.
- Digitalcin. See Digitalis.
- Digitaléine. See Digitalis.
- Digitalin. See Digitalis.
- Digitaline. See Digitalis.
- Digitaliresin. See Digitalis.
- DIGITALIS (*General Subject*). See Pneumonia. Lobar—Vasculo-Cardiac Neuroses; Irregular Heart.
- Digitalis Eruption. See Dermatitis Medicamentosa.
- Digitalis Purpurea. See Digitalis.
- Digitalisin. See Digitalis.
- Digitin. See Digitalis.
- Digitonin. See Digitalis.
- Digitoxin. See Digitalis.
- Digitoxiresin. See Digitalis.
- Di-iodo-betanaphthol. See Naphthalin.
- Di-iodoform. See Iodine; Iodoform.
- Diiodosalicylic Acid. See Iodine; Iodoform.
- Dilatation, Cardiac. See Heart, Dilatation of (Index)—Vascular System; Arteriosclerosis.
- Dilatation, Gastric. See Gastric Dilatation (Index).
- Dilatation of Cervix Uteri. See Cervix Uteri, Dilatation of (Index).
- Dilatation of Colon. See Colon, Dilatation of (Index).
- DILATATION OF HEART (*General Subject*). See Heart, Dilatation of (Index).
- Dilatation of Oesophagus. See Oesophagus; Stricture.
- Dilatation of Pupils. See Pupils, Dilatation of (Index).
- Dilatation of Stomach. See Gastric Dilatation (Index)—Stomach, Dilatation of (Index).
- Dilated Heart. See Heart, Dilatation of (Index)—Valvular Diseases of Heart; Mitral Stenosis.
- Dilated Pupils. See Pupils, Dilatation of (Index).
- Dillon's Antiseptic Dentifrice. See Potassium; Chlorate.
- Dimethyl-piperazin Tartrate. See Piperazin; Lyceol.
- Diminished Tension of Eyeball. See Tension of Eyeball.
- Dimness of Vision. See Toxic Foods; Muscarine Poisoning.
- Dingee. See Specific Infectious Fevers; Dengue.
- Dionin. See Opium; Derivative.

- Dipentene-Glycol. See Turpentine.
- DIPHTHERIA (*General Subject*). See Benzoic Acid—Bromides; Infectious Diseases—Chloral; Scarlatina and Diphtheria—Coffee; Caffeine; Febrile Maladies—Creasote; Ulcerations—Croup; Membranous—Hydrogen Dioxide—Intubation—Iron—Manganese; External Uses—Measles—Menthol; Naso-laryngeal Disorders—Mercury; Chlorides—Mercury; Cyanide—Mercury; Iodides—Nucleins—Oxygen; Inhalation—Ozone—Pancreatin—Parotitis; Infectious—Pepsin; Surgical Solvent—Petroleum; Respiratory Tract—Phenic (Carbolic) Acid—Phenic (Carbolic) Acid; Asepsol—Phenic (Carbolic) Acid; Bromol—Pix Liquida; Lysol—Potassium; Sozoiodolate—Resorcin—Rheumatism; Acute—Salicylic Acid; Salactol—Sodium; Laryngological Disorders—Sulphur; Respiratory Disorders—Toxic Foods; Pulmonals—Tracheo-Laryngeal Operations; Thyrotomy—Tracheo-Laryngeal Operations; Tracheotomy.
- Diphtheria, Catarrhal. See Diphtheria; Pharyngeal.
- Diphtheria Eruption. See Erythema Multiforme—Erythema Symptomaticum.
- Diphtheria, Nasal. See Nasal Diphtheria (Index).
- Diphtheritic Chancre. See Syphilis; Initial Lesion.
- Diphtheritic Conjunctivitis. See Conjunctivitis, Diphtheritic (Index).
- Diphtheritic Dysentery. See Dysentery.
- Diphtheritic Membrane. See Tonsils; Tonsillitis.
- Diphtheritic Neuritis. See Nerves, Peripheral, Multiple Neuritis.
- Diphtheritic Obstruction of Larynx. See Larynx, Diphtheritic Obstruction of (Index).
- Diphtheritic Paralysis. See Strychnine; Nervous Disorders.
- Diphtheritic Sore Throat. See Potassium; Chlorate.
- Diphtheritic Ulcers. See Phenic (Carbolic) Acid; Trichlorphenol.
- Diphtheritic Vaginitis. See Vagina.
- Diphtheritic Vulvitis. See Vagina; Vulva; Infectious Vulvitis.
- Diphtheritis. See Diphtheria.
- Diphtheroid Chancre. See Syphilis; Initial Lesion.
- Diplegia. See Encephalitis; Acute Non-suppurative—Encephalitis; Prenatal—Locomotor Ataxia; Ocular-Muscle Palsies—Sclerosis of the Brain.
- Diplococcus Lanceolatus, Fränkel's. See Meningitis; Cerebro-Spinal.
- Diplococcus Pneumoniæ. See Pneumonia, Lobar.
- Diplococcus, Weichselbaum-Jaeger. See Meningitis; Cerebro-Spinal.
- Diplopia. See Cerebral Hæmorrhage; Eye-symptoms—Gelsmium; Physiological Action—Lens; Anomalies of Position—Strabismus—Sulphonal; Physiological Action—Sulphonal; Poisoning—Toxic Foods; Shell-fish Poisoning.
- Diplopia, Crossed. See Strabismus.
- Diplopia, Homonymous. See Strabismus.
- Diplopia, Monocular. See Astigmatism; Irregular—Hysteria; Special Sense-organs—Strabismus.
- Diplopia, Transient. See Locomotor Ataxia; Ocular-Muscle Palsies.
- Dipsomania. See Insanity; Recurrent.
- Diresorcin-phthalein. See Resorcin; Resorcin-phthalin.
- Disinfectant. See Acetic Acid—Actol—Alcohol—Aluminium—Chromic Acid—Formaldehyde—Hydrogen Dioxide—Iodine and Derivatives—Manganese—Mercury—Ozone—Phenic (Carbolic) Acid—Phenic (Carbolic) Acid; Saprol—Pix Liquida; Derivatives and Allied Compounds—Sulphur; Fumigation.
- Disinfecting Fluid, Burnett's. See Zinc.
- Disinfection. See Formaldehyde—Variola.
- Dislocation, Muscular. See Muscles, Surgical Diseases.
- Dislocation of Penis. See Penis and Testicles; Injuries.
- Dislocation of Vertebra. See Spine, Diseases of; Sprain.
- DISLOCATIONS (*General Subject*). See Fractures.
- Dislocations of Bones of Thorax. See Wounds and Injuries of Thorax; Fractures.
- Dislocations of Lens. See Lens.
- Dispermin. See Piperazin.
- Displacements of Fallopian Tube. See Uterine Adnexa.
- Displacements of Ovary. See Uterine Adnexa.
- Displacements of Tendon. See Tendon; Wounds and Injuries.
- Displacements of Uterus. See Uterus, Displacements of (Index).
- Disseminated Neuritis. See Nerves, Peripheral; Multiple Neuritis.
- Disseminated Pneumonia. See Pneumonia, Catarrhal.
- Disseminated Sclerosis. See Alcoholic Neuritis—Hysteria—Locomotor Ataxia—Spinal Cord; Ataxic Paraplegia—Spinal Cord; Hereditary Ataxia—Spinal Cord; Primary Lateral Sclerosis.
- Disseminated Sclerosis in Children. See Encephalitis; Prenatal.
- Distended Bladder. See Bladder, Distended (Index).
- Distension, Intestinal. See Stomach, Surgery of; Intestines; Enterotomy.
- Distichiasis. See Palpebræ.
- Distoma Hæmatobium. See Hæmaturia—Parasites; Distoma.
- Distoma Hepaticum. See Parasites; Distoma.
- Distoma Lanceolatum. See Parasites; Distoma.
- Distoma Pulmonale. See Parasites; Distoma—Pulmonary Circulation; Hæmorrhage.
- Distomiasis. See Parasites; Trematodes.
- Diuresis. See Uterine Adnexa; Tumors of Ovaries.
- Diuretic. See Acetic Acid—Aconite—Adonis—Ammonium; Acetate—Apocynum Cannabinum—Atropine—Benzoic Acid—Boracic Acid—Cannabis Indica—Cantharides—Colchicum—Cimicifuga—Coffee and Caffeine—Colocynth—Convallaria Majalis—Copaiba—Corn-ergot and Corn-silk—Cubeb—Digitalis—Eucalyptus—Grindelia—Jaborandi—Juniper—Lithium—Mercury—Naphthol Compounds—Nitrites—Piperazin—Potassium—Salicylic Acid; Theobromine and Lithium Salicylate—Salicylic Acid; Theobromine and Sodium Iodosalicylate—Sodium—Turpentine.
- Divergent Strabismus. See Strabismus.
- Divergent Strabismus, Latent. See Strabismus; Latent.
- Diverticula. See Tumors; Cysts.
- Diverticula, Œsophageal. See Œsophagus.
- Diverticulum of Œsophagus. See Stomach; Surgery of; Gastrostomy.
- Dizziness. See Tumors of Brain—Tumors of Brain; Tumors of Cerebellum—Urinary System, Diseases of (Surgical); Movable Kidney—Valvular Diseases of Heart; Aortic Regurgitation—Valvular Diseases of Heart; Aortic Stenosis—Valvular Diseases of Heart; Tricuspid Regurgitation—Vascular Diseases of Brain; Embolism—Vascular Diseases of Brain; Thrombosis.
- Dochmuis Duodenalis. See Parasites; Intestinal; Anchylostoma.
- Donovan's Solution. See Arsenic; Preparations—Iodine; Preparations—Mercury; Iodides.
- Double Choked Disks. See Choked Disks, Double (Index).
- Double Optic Neuritis. See Optic Neuritis, Double (Index).
- Double Uterus. See Uterus; Malformations.
- Double Vision. See Strabismus.
- Douching, Vaginal. See Mercury; Poisoning.
- Douglas's Pouch, Hæmatocœle into. See Uterine Adnexa; Tumors of Ovaries.
- Dover's Powder. See Ipecac—Opium.
- Dracontiasis. See Parasites; Filaria.
- Dracunculus Medicinalis. See Parasites; Filaria.
- Drainage, Abdominal. See Uterine Adnexa; Tumors of Ovaries.
- Drooling. See Infantile Myxedema.
- Dropsy. See Apocynum Cannabinum—Bright's Disease; Acute—Bright's Disease; Exudative Chronic—Cantharides; Respiratory and Dropsical Maladies—Coffee; Caffeine—Colchicum—General Maladies—Colocynth; Gastro-Intestinal and Dropsical Disorders—Digitalis—Elatarium; Ascites—Iron; Cardiac Diseases—Jaborandi; Passive Effusions—Jalap—Juniper; Genito-Urinary Disorders—Mercury; Chlorides—Potassium; Purgatives—Pulmonary Circulation; Œdema—Salicylic Acid; Theobromine and Lithium Salicylate—Scarlet Fever—Strophanthus.
- Dropsy, Malignant. See Beriberi.
- Dropsy of Brain. See Hydrocephalus.
- Dropsy of Pericardial Sac. See Pericarditis; Hydropericardium.
- Dropsy of Pericardium. See Pericardium; Hydropericardium.
- Dropsy of Peritoneum. See Peritoneum; Ascites.
- Dropsy of Pleura. See Pleura; Hydrothorax.

- Dropsy, Thoracic. See Pleura; Hydrothorax.
 Drowsiness. See Sulphonal; Poisoning—Uramia.
 Drunkards, Morning Sickness of. See Nux Vomica; Gastro-Intestinal Disorders.
 Drunkenness. See Alcoholism — Wounds of Head; Extradural Hemorrhage.
 "Dry" Cholera. See Cholera Asiatica.
 Dry Mouth. See Salivary Glands; Xerostomia — Toxic Foods; Shell-fish Poisoning.
 Dry Pleurisy. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
 Dryopteris Filix Mas. See Male Fern.
 Ductus Arteriosus, Patency of. See Valvular Diseases of Heart; Aortic Regurgitation.
 Dulcin. See Phenacetin; Derivatives.
 Duodenal Catarrh. See Intestines; Duodenum, Inflammation of—Rhubarb—Salol.
 Duodenal Fistula. See Cholelithiasis.
 Duodenal Ulcers. See Abdomen; Burns — Burns — Intestines; Duodenum; Ulceration — Intestines; Tumors—Stomach, Diseases of; Gastric Ulcer.
 Duodenal Ulcers, Perforating. See Pancreas; Acute Pancreatitis—Stomach, Surgery of; Intestines; Resection.
 Duodenitis. See Intestines; Duodenum, Inflammation of.
 Duodenum, Carcinoma of. See Intestines; Tumors.
 Duodenum, Inflammation of. See Intestines.
 Duodenum, Perforation of. See Intestines; Duodenum; Ulceration — Liver; Empyema of Gall-bladder—Pancreas; Acute Pancreatitis.
 Duodenum, Rupture of. See Abdomen; Contusion.
 Duodenum, Tumors of. See Intestines; Tumors.
 Duplay's Operation. See Urinary System, Surgical Diseases of; Hypospadias.
 Dupuytren's Contracture. See Tendons; Contraction of Tendons.
 Dupuytren's Suture. See Stomach, Surgery of; Intestines; Enterorhaphy.
 Dwarfing. See Animal Extracts; Thyroid.
 Dynamic Inflammations. See Veratrum Viride.
 Dynamic Squint. See Strabismus; Latent.
 Dyschromatopsia. See Hysteria; Special Sense-organs.
 Dysenteric Ulcer. See Rectum and Anus; Non-malignant Ulceration.
 DYSENTERY (*General Subject*). See Camphor; Intestinal Fluxes — Colocynth; Gastro-Intestinal Disorders — Copper; Diarrhea — Cotton-plant — Creasote; Gastro-Intestinal Disorders — Ergot; Hemorrhage — Hamamelis; Astringent — Iodine; Rectal Injections — Ipecac; Intestinal Disorders — Krameria — Lead; Gastro-Intestinal Disorders — Liver; Abscess — Magnesia; Diarrhea — Mercury; Chlorides — Morphinomania — Naphthalin; Intestinal Disorders — Nux Vomica; Gastro-Intestinal Disorders — Pancreatin — Pelletierine — Quebracho — Rectum and Anus; Pruritus Ani — Resorcin; Resorcin-salol — Salicylic Acid — Salicylic Acid; Cresol Salicylate — Salicylic Acid; Guaiacol Salicylate — Salicylic Acid; Salacetol — Salicylic Acid; Salicyl-resorcin Silver; Gastro-Intestinal Disorders — Sodium; Gastro-Intestinal Disorders — Sulphur; Poisoning — Zinc; Gastro-Intestinal Disorders.
 Dysentery, Amebic. See Quinine.
 Dysentery, Chronic. See Salicylic Acid; Camphor Salicylate.
 Dysentery, Epidemic. See Strychnine; Gastro-Intestinal Disorders.
 Dyslexia. See Vascular Diseases of Brain; Thrombosis.
 DYSMENORRHOEA (*General Subject*). See Abortion — Acetanilid; Neuralgia — Antipyrine; Nervous Disorders — Apol — Belladonna; Spasmodic Disorders — Bromides — Cajuput-oil; Nervous Diseases — Chloral; Genito-Urinary — Cimicifuga — Endometritis — Hydrastis; Hemorrhage — Iron; Neuroses — Juniper — Manganese; Menstrual Disorders — Metritis; Menstrual Subinvolution — Nitrites; Neuralgia—Nux Vomica; Uterine Disorders — Salicylic Acid; Antipyrine Salicylate — Uterus; Antelexion — Uterus; Malformations — Uterus; Retroflexion.
 Dysmenorrhœa, Colicky. See Uterus; Stenosis of Cervix.
 Dyspareunia. See Endometritis—Menopause; Hystero-disturbances—Rectum and Anus; Irritable Uterus—Uterus; Malformations.
 Dyspepsia. See Bismuth—Colocynth; Gastro-Intestinal Disorders—Oxygen; Oxygen-water—Phosphorus; Poisoning — Pix Liquida; Lysol—Potassium; Cobalto-nitrite — Quassia; Gastro-Intestinal Disorders—Quinine; Tonic—Resorcin—Salicylic Acid; Bismuth Salicylate — Strychnine; Gastro-Intestinal Disorders—Zinc; Gastro-Intestinal Disorders.
 Dyspepsia, Acid. See Acid Gastritis (Index)—Potassium; Antacids—Sodium; Gastro-Intestinal Disorders—Strontium; Gastro-Intestinal Disorders.
 Dyspepsia, Atonic. See Eucalyptus; Gastro-Intestinal Disorders — Gentian—Hydrastis; Catarrhal Disorders—Hydrochloric Acid; Gastric Disorders — Lupulus; Stomachic—Nux Vomica; Gastro-Intestinal Disorders — Pepsin — Potassium; Antacids.
 Dyspepsia, Fermentative. See Salicylic Acid.
 Dyspepsia, Flatulent. See Ipecac — Nux Vomica; Gastro-Intestinal Disorders—Strontium; Gastro-Intestinal Disorders.
 Dyspepsia, Intestinal. See Ox-gall.
 Dyspepsia, Irritable. See Cerium; Gastric Disorders.
 Dyspepsia, Nervous. See Gold—Hydrocyanic Acid; Gastric Disorders — Menthol; Gastro-Intestinal Disorders — Nerves, Peripheral; Localized Neuritis — Potassium; Cyanide — Silver; Gastro-Intestinal Disorders.
 Dyspepsia with Yeasty Vomiting. See Silver; Gastro-Intestinal Disorders.
 Dysphagia. See Hysteria; Visceral and Vasomotor Disturbances — Leukemia — Mediastinum; Abscess—Mediastinum; Tumors—Mercury; Poisoning — Esophagus — Pericardium; Pericarditis — Pseudoleukemia — Respiratory Passages; Paralysis of Pharynx — Stomach, Diseases of; Carcinoma—Stomach, Diseases of; Functional; Cardiospasm — Tetanus — Tonsils; Tonsillitis—Toxic Foods; Shell-fish Poisoning — Tuberculosis of Larynx — Tumors of Larynx and Lungs; Carcinoma of Larynx.
 Dyspnoea. See Acetanilid; Poisoning — Antipyrine; Poisoning — Bright's Disease—Chloral; Respiratory Diseases — Chloral; Toxic Effects — Coffee; Caffeine — Croup; Catarrhal — Croup; Membranous — Digitalis—Dilatation of the Heart—Exophthalmic Goitre — Goitre — Gout; Irregular—Grindelia — Insolation — Intubation — Jalap—Laryngitis; CEdema — Leukemia — Locomotor Ataxia; Tabetic Crises — Miliary Fever—Muscles; Infectious Myositis — Myocarditis — Nitrites; Cardiac Disorders — Nitrites; Pulmonary Disorders — Nitroglycerin; Circulatory Disorders — Nux Vomica; Pulmonary Disorders — Esophagus; Diverticula — Esophagus; Foreign Bodies — Oxygen; Inhalation — Parasites; Trichina — Phenacetin; Poisoning — Pleura, Diseases of — Pleurisy; Acute — Pneumonia, Catarrhal — Pneumonia, Lobar — Pneumonokoniosis — Pseudoleukemia — Pulmonary Circulation; Atelectasis—Pulmonary Circulation; Congestion—Pulmonary Circulation; Embolism — Pulmonary Circulation; CEdema — Pulmonary Emphysema; Vesicular — Pyrogallol; Poisoning — Quebracho — Respiratory Organs; Abductor Paralysis — Respiratory Organs; Laryngismus Stridulus—Respiratory Passages; Larynx — Salicylic Acid; Poisoning — Salicylic Acid; Theobromine and Sodium Salicylate — Sodium; Genito-Urinary Disorders — Spasms in Children; Tetany—Stomach, Diseases of; Functional; Pneumatoses — Strychnine; Pulmonary Disorders — Thyroid Gland; Tumors — Tongue; Glossitis — Tonsils; Retropharyngeal Abscess—Toxic Foods; Muscarine Poisoning — Toxic Foods; Shell-fish Poisoning — Tuberculosis of Lungs; Phthisis Florida — Tumors of Larynx and Lungs; Carcinoma of Larynx — Tumors of Larynx and Lungs; Larynx—Typhoid Fever—Uramia—Valvular Diseases of Heart; Pulmonary Stenosis — Valvular Diseases of Heart; Tricuspid Stenosis — Vascular System; Arteriosclerosis — Vascular System; Vascular Obstruction; Fat-embolism — Wounds (Septic) and Gangrene; Pyæmia — Wounds and Injuries of Thorax; Mural Injuries.
 Dyspnoea, Cardiac. See Nitrites.
 Dystocia. See Parturition, Abnormal — Uterus; Myoma.
 Dysuria. See Cannabis Indica; Renal and Urinary Maladies — Gelsemium; Spasmodic Disorders — Penis and Testicles; Phimos — Urinary System, Surgical Diseases of; Tumors of Prostate.

- Ear, Aspergillus in. See External Ear.
 Ear, Cerumen in. See Ear, Wax in (Index).
 Ear, Disease of. See Cerebral Abscess.
 Ear, Disease of Middle. See Middle Ear (Index)—Quinine; Contra-indications.
 Ear, Eczema of. See Eczema of Ear (Index).
 Ear, External. See External Ear.
 Ear, Foreign Bodies in. See External Ear.
 Ear, Furuncle of. See External Ear—Menthol; Ear Diseases—Abdomen; Contusions.
 Ear, Hemorrhage from. See Fractures of Skull.
 Ear in Deaf-mutes. See Deaf-mutism.
 Ear, Insects in. See Olive-oil.
 Ear, Internal. See Internal Ear.
 Ear, Middle. See Middle Ear (Index).
 Ear Vertigo. See Middle Ear; Chronic Otitis.
 Ear, Wax in. See Ear, Cerumen in (Index)—External Ear; Cerumen—External Ear; Inspissated Cerumen.
 Earache. See Influenza—Lupulus; External Uses—Menthol; Ear Diseases—Middle Ear, Diseases of—Otalgia (Index)—Salol; Camphorated—Wounds of Head; Diseases Involving Skull.
 Earache, Neuralgic. See Atropine; Neuralgia.
 Ear-drum, Paracentesis of. See Guaiacol; Anæsthesia—Middle Ear; Acute Otitis.
 Ears, Buzzing in. See Vascular System; Injuries of Blood-vessels; Hemorrhage.
 Eberth, Bacillus of. See Typhoid Fever.
 Ecboic. See Cotton-plant—Digitalis—Ergot—Hydrastis—Quinine.
 Ecboic Acid. See Ergot.
 Ecboiline. See Ergot.
 Echchondroses. See Tumors; Connective Tissue.
 Echinomoses. See Scorbutus—Scorbutus, Infantile—Wounds and Stings; Snake-bites.
 Ecchymosis, Conjunctival. See Conjunctiva; Miscellaneous Disorders.
 Ecgonine. See Erythroxylon Coca.
 Echinococci of Lungs. See Parasites; Echinococcus.
 Echinococcic Cyst. See Liver; Angiocholitis.
 Echinococcic Cysts of Pelvis. See Syphilis; Period of Sequelæ.
 Echinococcic Cyst, Orbital. See Orbit; Tumors.
 Echinococcic Disease. See Parasites; Echinococcus.
 Echinococcic Liver. See Liver; Tumors.
 Echinococcus Cyst. See Hydronephrosis.
 Echinococcus of Pleura. See Pleura.
 Echinococcus, Tænia. See Tænia Echinococcus (Index).
 ECLAMPSIA (*General Subject*). See Bright's Disease; Acute—Bromides; Chorea, etc.—Chloral—Chloroform—Jaborandi; Uræmia—Nursing and Artificial Feeding; Nursing—Parturition, Abnormal—Potassium; Diuretics—Sodium; Genito-Urinary Disorders—Veratrum Viride.
 Eclampsia Infantilis. See Spasms and Convulsions in Children.
 Eclampsia Nutans. See Spasms in Children; Automatic Movements.
 Eclampsia Rotans. See Spasms in Children; Automatic Movements.
 Ecstasies. See Spasms in Children; Hysteria.
 Ecstasy. See Catalepsy—Hysteria; Paroxysmal Symptoms.
 Ectasia of Colon. See Intestines; Colon, Dilatation of.
 Ectasis, Alveolar. See Pulmonary Emphysema; Vesicular.
 Ecthyma. See Meningitis; Cerebro-Spinal.
 Ecthyma, Syphilitic. See Syphilis; Syphilides.
 Ectocyst. See Liver; Hydatid Cyst.
 Ectopia Lentis. See Lens; Anomalies of Position.
 Ectopic Gestation. See Gestation, Ectopic (Index).
 Ectopic Gestation, Rupture of. See Uterine Adnexa; Tumors of Ovaries.
 Ectropion. See Conjunctiva; Granular Conjunctivitis—Palpebræ; Acquired Anomalies.
 Ectropion of Lips. See Plastic Surgery.
 ECZEMA (*General Subject*). See Acne Rosacea—Ailro; Disorders of Skin—Aluminium; Borotanate—Alumnoi; Dermatology—Aristol; Skin Diseases—Arsenic; Skin Diseases—Belladonna; Cutaneous Disorders—Benzoin—Bismuth; Locally—Boric Acid—Boric Acid; Sodium Biborate—Bright's Disease; Exudative Chronic—Bright's Disease; Non-exudative Chronic—Cannabis Indica; Skin Diseases—Cantharides; Skin Diseases—Chaulmugra-oil—Chloral; Skin Diseases—Chrysarobin; Skin Diseases—Cinchona; Poisoning—Dermatitis Exfoliativa; Chronic General—Dermatitis Exfoliativa; Epidemic—Dermatitis Herpetiformis—Dermatitis Maligna—Diabetes Mellitus; Skin Complications—Elephantiasis—Erythema Multiforme—Europhen; Cutaneous Disorders—Gelsium; Skin Disorders—Gout; Irregular—Herpes—Herpes Genitalis—Herpes Zoster—Ichthyol; Cutaneous Disorders—Intertrigo—Iodine; Aristol—Iodine; Iodism—Jaborandi; Cutaneous Disorders—Lead; External Application—Male Fern—Mercury; Chlorides—Mercury; Nitrates—Mercury; Oxides—Naphthalin; Cutaneous Disorders—Petroleum; External Use—Phenic (Carbolic) Acid; Cutaneous Disorders—Phenic (Carbolic) Acid; Phenosalyl—Phosphorus; Cutaneous Disorders—Picric Acid—Pix Liquida; Cutaneous Disorders—Potassium; Alkaline Lotions—Potassium; Chlorate—Potassium; Dithiocarbonate—Potassium; Soziodolate—Psoriasis—Resorcin—Resorcin; Resorcinol—Salicylic Acid—Salol—Salophen—Seborrhœa—Silver; Cutaneous Disorders—Sodium; Gastro-Intestinal Disorders—Strontium; Cutaneous Disorders—Sulphur; Cutaneous Disorders—Thiol—Thymol—Variola; Vaccinia—Zinc; Cutaneous Disorders.
 Eczema, Infantile. See Quinine; Contra-indications.
 Eczema Marginatum. See Pyrogallol.
 Eczema of Ear. See External Ear; Eczematous Inflammation—Phenic (Carbolic) Acid; Diaphtherin.
 Eczema of Eyelids. See Palpebræ; Cutaneous Disorders.
 Eczema of Nipples. See Mammary Gland.
 Eczema of Nose. See Phenic (Carbolic) Acid; Diaphtherin.
 Eczema of Vulva. See Potassium; Alkaline Lotions.
 Eczematous Eruption. See Iodine; Iodoform; Untoward Effects—Vascular System; Varix.
 Eczematous Vaginitis. See Vagina.
 Eczematous Vulvitis. See Vagina; Vulva; Infectious Vulvitis.
 Edible Mushrooms. See Toxic Foods.
 Effervescent Draught. See Potassium; Anti-emetics.
 Effusion, Arthritic. See Joints, Surgical Diseases of—Specific Infectious Fevers; Malta.
 Effusion, Intraventricular. See Tumors of Brain.
 Effusion, Pericardial. See Pericardial Effusion (Index).
 Effusion, Peritoneal. See Magnesia; Serous Effusions—Peritoneum.
 Effusion, Pleural. See Pleural Effusion (Index).
 Effusion, Pleuritic. See Pleural Effusion (Index).
 Effusion, Serous. See Potassium; Diuretics—Potassium; Purgatives.
 Egyptian Chlorosis. See Parasites; Intestinal; Anchylostoma.
 Egyptian Ophthalmia. See Conjunctiva; Granular Conjunctivitis.
 Ehrlich, Diazo-reaction of. See Typhoid Fever.
 Ehrlich's Test for Bilirubin. See Choloria.
 Elaterin. See Elaterium.
 Elaterinum. See Elaterium.
 ELATERIUM (*General Subject*).
 Elbow, Dislocations of. See Dislocations.
 Electric Chorea. See Chorea.
 Electric Sun-stroke. See Insolation; Thermic Fever.
 Electrical Burns. See Burns.
 Electricity. See Abortion—Actinomycosis—Adenitis—Agalactia—Alcoholic Neuritis—Alopecia Areata—Amenorrhœa—Angina Pectoris—Asthma—Athetosis—Beriberi—Chloroform—Constipation—Dysmenorrhœa—Encephalitis—Enuresis—Exophthalmic Goitre—Gout—Herpes Zoster—Hysteria—Intestines; Colitis; Mucous—Intestines; Colon; Dilatation—Lead; Treatment of Chronic Poisoning—Locomotor Ataxia—Metritis—Muscles; Hypertrophy—Nasal Cavities; Atrophic Rhinitis—Nerves, Peripheral; Neuritis—Nerves, Peripheral; Sciatica—Nerves, Wounds and Injuries of—Neuralgia—Neurasthenia—Obstruction, Intestinal—Pregnancy, Disorders of—Respiratory Organs; Laryngeal Neuroses—Rheumatism; Chronic Articular—Sprains—Uterus; Myoma.
 Electrolysis. See Acne—Acne Rosacea—Aneurism—

- Conjunctiva; Vernal Conjunctivitis—Cornea, Opacities of—Epistaxis—Nasal Cavities; Atrophic Rhinitis—Naso-pharynx; Tumors.
- Electromassage. See Stomach, Diseases of; Dilatation.
- ELEPHANTIASIS (*General Subject*). See Acromegaly—Jaborandi; Cutaneous Disorders—Parasites; Filaria—Tumors; Fibromata—Vagina; Hypertrophy of Vulva.
- Elephantiasis of Penis. See Penis and Testicles; Tumors.
- Elephantiasis Telangiectodes. See Elephantiasis.
- Elephantoid Fever. See Elephantiasis.
- Emaciation. See Stomach, Diseases of; Carcinoma—Stomach, Diseases of; Functional Diseases; Anorexia—Stomach, Diseases of; Gastric Ulcer—Suprarenal Capsules; Tumors—Surgical Diseases; Secondary Wound Fever—Thymol; Physiological Action—Typhoid Fever—Urinary System, Diseases of (Surgical); Tumors of Kidney—Wounds (Septic) and Gangrene; Pyæmia.
- Embolism. See Diphtheria—Fractures—Meningitis; Leptomenigitis—Pregnancy, Disorders of; Embolism and Thrombosis—Surgical Diseases of the Skin and its Appendages; Constitutional Effects of Cold—Valvular Diseases of Heart; Acute Endocarditis—Valvular Diseases of Heart; Aortic Regurgitation—Vascular Diseases of Brain; Thrombosis—Vascular System; Phlegmasia Alba Dolens—Vascular System; Vascular Obstruction—Vascular System; Vascular Obstruction; Fat-embolism—Wounds and Injuries of Thorax; Wounds of Heart.
- Embolism and Thrombosis of Central Retinal Artery. See Optic Nerve and Retina.
- Embolism, Arterial. See Vascular System; Vascular Obstruction; Embolism.
- Embolism, Fat-. See Fractures—Vascular System; Vascular Obstruction.
- Embolism of Brain. See Vascular Diseases of Brain; Embolism.
- Embolism of Lungs. See Pulmonary Circulation; Pulmonary Embolism.
- Embolism of Splenic Artery. See Spleen; Infarcts.
- Embolism, Pulmonary. See Pulmonary Embolism (Index).
- Embolus. See Vascular System; Arteriosclerosis—Vascular System; Vascular Obstruction; Embolism.
- Embryocardia. See Vasculo-Cardiac Neuroses; Irregular Heart.
- Embryotomy, Total. See Parturition, Abnormal.
- Emesis. See Veratrum Viride—Vomiting (Index).
- Emetic. See Alum—Apomorphine—Chamomile—Copper—Ipecac—Lobelia—Mustard—Zinc; Physiological Action.
- Emetina. See Ipecac.
- Emetine. See Ipecac.
- Emissions, Nocturnal. See Hyoscyamus.
- Emissions, Seminal. See Seminal Emissions (Index).
- Emmenagogue. See Apol—Cantharides—Cotton-plant—Manganese—Quinine.
- Emmet's Operation. See Uterus; Laceration of Cervix—Vagino-Perineal Injuries.
- Emollient. See Glycerin—Olive-oil—Petroleum.
- Emphysema. See Asthma—Belladonna: Spasmodic Disorders—Dilatation of the Heart—Diphtheria—Grindelia—Nux Vomica; Pulmonary Disorders—Oxygen; Inhalation—Ozone—Portusiss—Physostigma; Respiratory Disorders—Pleura; Pneumothorax—Pneumonia, Catarrhal—Pneumokoniosis—Pulmonary Circulation; Hæmorrhage—Pulmonary Emphysema—Resorcin—Strychnine; Pulmonary Disorders—Typhoid Fever.
- Emphysema about Wound. See Wounds and Injuries of Thorax; Non-penetrating Wounds.
- Emphysema, Atrophic. See Pulmonary Emphysema.
- Emphysema, Gangrenous. See Surgical Diseases; Malignant Oedema.
- Emphysema, Pulmonary. See Pulmonary Emphysema.
- Emphysema, Senile. See Pulmonary Emphysema.
- Emphysema, Subcutaneous. See Pulmonary Emphysema; Interlobular—Wounds (Septic) and Gangrene; Septicæmia—Wounds and Injuries of Thorax; Pneumothorax—Wounds and Injuries of Thorax; Rupture of Lung—Wounds and Injuries of Thorax; Subcutaneous Emphysema—Wounds and Injuries of Thorax; Wounds of Lung.
- Emphysema, Substantive. See Pulmonary Emphysema.
- Emplastrum Resinæ. See Lead.
- Emplastrum Saponis. See Lead.
- Emprosthotonos. See Ergot; Poisoning.
- Empyema. See Aneurism; Hæmothorax and Empyema—Creasote; Ulcerations—Iodine; Parenchymatous Injections—Liver; Abscess—Liver; Perihepatitis—Malarial Fevers; Septic Processes—Pleurisy; Acute—Typhoid Fever—Wounds and Injuries of Thorax; Foreign Bodies in Chest—Wounds and Injuries of Thorax; Secondary Complications.
- Empyema, Circumscribed. See Bronchiectasis.
- Empyema, Mastoid. See Middle Ear.
- Empyema Necessitatis. See Pleurisy; Acute.
- Empyema of Ethmoidal Sinus. See Orbit; Miscellaneous Diseases.
- Empyema of Frontal Sinus. See Orbit; Miscellaneous Diseases.
- Empyema of Gall-bladder. See Gall-bladder, Empyema of (Index).
- Empyema of Maxillary Sinus. See Orbit; Miscellaneous Diseases.
- Empyema of Sinuses. See Nasal Cavities; Purulent Rhinitis.
- Empyema, Putrid. See Indicanturia.
- EMPHYEMA, THORACIC (*General Subject*).
- Encephalic Abscess. See Brain Abscess (Index)—Cerebral Abscess (Index)—Encephalitis.
- ENCEPHALITIS (*General Subject*). See Meningitis; Leptomenigitis—Wounds of Head; Wounds of Brain.
- ENCEPHALOCOELE (*General Subject*).
- Encephaloid Cancer of Breast. See Tumors of Breast; Cancer.
- Encephaloid Tumors. See Tumors.
- Encephalonarrosis. See Encephalitis.
- Encephalopathy, Lead. See Lead Encephalopathy (Index).
- Enchondroma. See Tumors.
- Enchondroma of Fallopian Tubes. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Enchondroma of Pelvis. See Syphilis; Period of Sequelæ.
- Enchondroma of Pharynx. See Tonsils; Tumors.
- Enchondroma of Rectum. See Tumors of Rectum and Anus; Benign.
- Endarteritis. See Typhoid Fever—Vascular System; Arteritis.
- Endarteritis, Cerebral. See Phosphorus.
- Endemic Cholera. See Cholera Morbus.
- Endemic Chorea. See Chorea.
- Endemic Neuritis. See Nerves, Peripheral; Multiple Neuritis.
- Endocarditis. See Pericardium; Pericarditis—Pneumonia, Lobar—Quinine; Inflammation—Rheumatism; Acute—Scarlet Fever—Specific Infectious Fevers; Terminal Infection—Typhoid Fever—Valvular Diseases of Heart—Wounds (Septic) and Gangrene; Septicæmia.
- Endocarditis, Acute. See Valvular Diseases of Heart.
- Endocarditis, Chronic. See Valvular Diseases of Heart; Chronic Endocarditis.
- Endocarditis, Malignant. See Malarial Fevers; Septic Processes.
- Endocarditis, Septic. See Typhoid Fever.
- Endocarditis, Ulcerative. See Spleen; Abscess—Spleen; Hyperæmia.
- Endocyst. See Liver; Hydatid Cyst.
- ENDOMETRITIS (*General Subject*). See Aristol; Gynæcology—Copper; Uterine Disorders—Formaldehyde; Gynæcological Disorders—Menopause—Metritis—Nitric Acid; Local Uses—Phenic (Carbolic) Acid; Phenosalyl—Quebracho; Topical Uses—Thiol—Uterus; Anteflexion—Uterus; Stenosis of Cervix—Uterus; Tuberculosis.
- Endometritis, Cervical. See Uterus; Tuberculosis.
- Endometritis, Fungous. See Picric Acid—Salol.
- Endometritis, Gonorrhæal. See Alun.nol; Gynæcology.
- Endometritis, Hypertrophic. See Menopause.
- Endometrium, Adenocarcinoma of. See Uterus; Carcinoma of Corpus Uteri.
- Endometrium, Carcinoma of. See Uterus; Carcinoma of Corpus Uteri—Uterus; Sarcoma.

- Endometrium, Malignant Adenoma. See Uterus; Carcinoma of Corpus Uteri.
- Endometrium, Sarcoma of. See Uterus; Sarcoma.
- Endothelioma of Lung. See Tumors of Larynx and Lungs; Lungs.
- Enemata. See Cholera Asiatica — Dysentery — Obstruction, Intestinal — Yellow Fever.
- Enemata, Creasote. See Pneumonia, Catarrhal.
- Enemata, Glycerin. See Constipation.
- Enemata, Nutritive. See Pancreatin — Stomach, Diseases of; Gastric Ulcer.
- Enemata, Oil. See Constipation.
- Enemata, Peptonized Nutritive. See Pancreatin.
- Engorgement, Chronic Venous. See Turpentine.
- Engorgement, Pulmonary. See Valvular Diseases of Heart; Mitral Stenosis.
- Enlarged Heart. See Valvular Diseases of Heart; Mitral Regurgitation.
- Enlarged Lymphatic Glands. See Lymphatic Glands, Enlarged (Index).
- Enlargement, Abdominal. See Uterine Adnexa; Tumors of Ovaries.
- Enlargement of Spleen. See Spleen, Enlargement of (Index).
- Enophthalmos. See Orbit; Congenital Malformations.
- Enostoses. See Tumors; Connective Tissue — Tumors; Osteomata — Wounds of Head; Tumors of Skull.
- Ensiform Process, Dislocation of. See Dislocations.
- Enteralgia. See Hydrocyanic Acid; Gastric Disorders.
- Enterectomy. See Intestines; Tumors — Stomach, Surgery of; Intestines; Resection.
- Enteric Fever. See Typhoid Fever (Index).
- Enteritis. See Intestines — Magnesia; Purgative — Obstruction, Intestinal; Acute Enteritis — Peritoneum; Tuberculous Peritonitis — Resorcin — Salicylic Acid; Bismuth Salicylate.
- Enteritis, Amöbic. See Dysentery; Amöbic.
- Enteritis, Gastro-. See Gastro-enteritis (Index).
- Enteritis, Membranous. See Intestines; Colitis; Mucous.
- Enteritis, Mucous. See Intestines; Colitis; Mucous.
- Enterocoele. See Hernia; Surgical Anatomy.
- Enterocolisma. See Cholera Asiatica.
- Enterocolitis. See Peritoneum; Acute Peritonitis — Quinine; Antiseptic.
- Enterostomy. See Stomach, Surgery of; Intestines; Anastomosis.
- Enteropileocele. See Hernia; Surgical Anatomy.
- Enteroliths. See Intestines, Tumors — Obstruction Intestinal.
- Enteroliths, Magnesia. See Obstruction, Intestinal.
- Enteroptosis. See Intestines — Stomach, Diseases of; Gastroptosis.
- Enterorrhaphy. See Abdomen; Injuries of the — Stomach, Surgery of; Intestines.
- Enterostomy. See Stomach, Surgery of; Intestines.
- Enterostomy, Gastro-. See Gastro-enterostomy (Index).
- Enterotomy. See Stomach, Surgery of; Intestines.
- Enterovaginal Fistula. See Vagina; Fistula.
- Entropion. See Palpebrae, Diseases of; Acquired Anomalies.
- Enucleation. See Uterus; Myoma.
- ENURESIS (*General Subject*). See Belladonna; Spasmodic Disorders — Cubeb; Catarrhal — Epilepsy — Ergot; Genital Disorders — Hypnotism — Incontinence of Urine (Index) — Naso-pharynx; Adenoids.
- Ephelis. See Creasote; Skin Diseases.
- Epicanthus. See Palpebrae; Congenital Anomalies.
- Epidemic Catarrh. See Influenza.
- Epidemic Catarrhal Fever. See Influenza.
- Epidemic Cerebro-Spinal Meningitis. See Meningitis; Acute Leptomenigitis.
- Epidemic Cholera. See Cholera Asiatica — Cholera Morbus.
- Epidemic Chorea. See Chorea; Anomalous Varieties.
- Epidemic Diarrhoea. See Strychnine; Gastro-Intestinal Disorders.
- Epidemic Dysentery. See Strychnine; Gastro-Intestinal Disorders.
- Epidemic Parotitis. See Parotitis; Infectious.
- Epidemic Stomatitis. See Mouth and Lips, Diseases of; Parasitic Stomatitis.
- Epididymis, Gumma of. See Syphilis; Period of Sequela.
- Epididymis, Syphilis in. See Syphilis; Period of Sequela.
- Epididymitis. See Guaiacol; Painful Disorders — Mercury; Metallic — Parotitis; Infectious — Penis and Testicles; Epididymitis — Penis and Testicles; Orchitis — Penis and Testicles; Torsion of Testicle — Silver; Venereal Disorders.
- Epididymitis, Syphilitic. See Penis and Testicles; Epididymitis.
- Epididymitis, Tubercular. See Penis and Testicles; Epididymitis.
- Epigastric Heat. See Thymol; Physiological Action.
- Epigastric Hernia. See Hernia; Ventral.
- Epigastric Impulse. See Valvular Diseases of Heart; Tricuspid Regurgitation.
- Epigastric Pulsation. See Hypertrophy of Heart.
- Epigastrium, Persistent Pain in. See Morphomania.
- Epigastrium, Pulsation in. See Hypertrophy of Heart.
- Epiglottis, Oedema of. See Ichthyol; Miscellaneous Disorders.
- Epiglottis, Turban-like. See Tuberculosis of Larynx.
- Epilepsia Loquax. See Epilepsy.
- Epilepsia Nutans. See Epilepsy.
- Epilepsia Procursiva. See Epilepsy.
- EPILEPSY (*General Subject*). See Acetanilid; Nervous Disorders — Adonis — Alcoholism; Acute — Amylene-hydrate — Animal Extracts; Brain — Animal Extracts; Orchitic — Animal Extracts; Ovarian — Animal Extracts; Thyroid — Antipyrine; Nervous Disorders — Belladonna — Boracic Acid; Borax — Bromides — Camphor; Monobromated — Cantharides; Nervous Disorders — Catalpa — Cerium; Nervous Disorders — Chloral — Chloroform — Copper; Convulsive Diseases — Curara — Deaf-mutism; Heredity — Erythema Symptomaticum; Anomalous Forms — Erythroxylon Coca and Cocaine — Exalgine — Exophthalmic Goitre — Hysteria — Hypnotism — Indianurina — Insanity — Iron; Neuroses — Lithium — Lobelia — Middle Ear; Chronic Catarrhal Otitis — Naso-pharynx; Chronic Naso-pharyngitis — Nitrites; Nervous Disorders — Nitroglycerin; Nervous Disorders — Nursing and Artificial Feeding; Nursing — Pericardium; Pericarditis — Physostigma; Spasmodic Disorders — Potassium; Osmate — Quinine; Contra-indications — Respiratory Organs; Nasal Reflex — Neuroses — Silver; Nervous Disorders — Silver; Silver Chloride — Spasms in Children; Hysteria — Spinal Cord; Poliomyelitis — Strontium; Nervous Disorders — Strychnine; Nervous Disorders — Sulphonal — Uræmia — Zinc; Nervous Disorders.
- Epilepsy, Anomalous. See Spasms in Children; Automatic Movements.
- Epilepsy, Cardiac. See Epilepsy.
- Epilepsy, Hystero-. See Hystero-epilepsy (Index).
- Epilepsy, Jacksonian. See Meningitis; Leptomenigitis — Tumors of Brain — Tumors of Brain; Tumors in Rolandic Region.
- Epilepsy, Saturnine. See Lead; Chronic Poisoning.
- Epileptic Dementia. See Insanity.
- Epileptic Fits. See Rheumatism; Acute.
- Epileptiform Angina Pectoris. See Zinc; Nervous Disorders.
- Epileptiform Attacks. See Fatty Heart; Fatty Degeneration — Valvular Diseases of Heart; Aortic Stenosis.
- Epileptiform Convulsions. See Convulsions, Epileptiform (Index).
- Epileptiform Disorders. See Parasites; Intestinal Ascari.
- Epileptiform Fits. See Wounds of Head; Wounds of Brain.
- Epileptiform Vertigo. See Zinc; Nervous Disorders.
- Epileptoid Convulsions. See Aconite; Poisoning.
- Epiphyseolysis. See Fractures of Femur.
- Epiplocele. See Hernia; Surgical Anatomy.
- Episcleritis. See Animal Extracts; Suprarenal; Ophthalmology — Jaborandi; Ophthalmic Disorders.
- Epispadia. See Urinary System, Surgical Diseases of; Anomalies of Urethra.
- Epispadias. See Urinary System, Surgical Diseases of — Urinary System, Surgical Diseases of; Injuries of Bladder.
- Epispastic. See Cantharides — Mustard.
- Epispastic Paper. See Cantharides.

- EPISTANTIS** (*General Subject*). See Alum—Antipyrine; Local Use—Bright's Disease; Non-exudative Chronic—Cinnamon—Diphtheria—Ergot; Hæmorrhage—Hæmophilia—Hamamelis; Hæmorrhage—Hydrastis; Hæmorrhage—Ipecac; Hæmorrhage—Iron; Hæmorrhage—Kino—Leprosy—Leukæmia—Malarial Fevers; Pernicious—Miliary Fever—Myxædema—Nasal Cavities; Tumors—Pertussis—Pseudoleukæmia—Plague—Pulmonary Circulation; Hæmorrhage—Respiratory Passages; Nasal Cavities—Scorbutus—Sodium; Laryngological Disorders—Specific Infectious Fevers; Dengue—Specific Infectious Fevers; Relapsing—Thyroid Gland; Thyroiditis—Typhoid Fever.
- Epithelial Odontome**. See Tumors; Connective Tissue.
- Epithelial (Organoid) Tumors**. See Tumors.
- Epithelial Tumors**. See Tumors.
- Epithelioma**. See Arsenic; Tumors—Mercury; Nitrates—Methyl-blue; Malignant Tumors—Ozone—Petroleum; External Use—Potassium; Chlorate—Pyrogallol—Resorcin—Sodium; Laryngological Disorders—Surgical Diseases of the Skin and its Appendages; Sebaceous Cysts—Tuberculosis of Skin; Lupus Vulgaris—Tumors; Epithelial (Organoid)—Zinc; Cutaneous Disorders.
- Epithelioma of Conjunctiva**. See Conjunctiva; Tumors.
- Epithelioma of Eyelids**. See Palpebræ; Tumors.
- Epithelioma of Intestines**. See Intestines; Tumors.
- Epithelioma of Larynx**. See Tumors of Larynx and Lungs; Larynx.
- Epithelioma of Penis**. See Penis and Testicles; Tumors.
- Epithelioma of Rectum**. See Rectum, Epithelioma of (Index).
- Epithelioma of Skull**. See Wounds of Head; Tumors of Skull.
- Epithelioma of Tongue**. See Tongue; Cancer.
- Epithelioma of Vulva**. See Vagina; Tumors of Vulva.
- Epithelioma, Rectal**. See Rectum, Epithelioma of.
- Epithelioma, Squamous**. See Tumors.
- Epitheliomatous Cancer of Tongue**. See Tongue; Leukoplakia.
- Epsom Salts**. See Magnesia—Oxalic Acid.
- Epulis**. See Actinomycosis—Jaws.
- Equinia**. See Glanders.
- Equino-valgus**. See Orthopædic Surgery; Club-foot.
- Equino-varus**. See Orthopædic Surgery; Club-foot.
- Erb's Juvenile Atrophy**. See Muscles; Progressive Muscular Dystrophies.
- Erb's Sign**. See Spasms in Children; Tetany.
- Erectile Tumor of Scalp**. See Wounds of Head; Tumors of Scalp.
- Erections, Painful**. See Urinary System, Surgical Diseases of; Gonorrhœa.
- Erethism**. See Lupulus; Genito-Urinary Irritation—Urinary System, Surgical Diseases of; Hypertrophy of Prostate.
- Ergochrysin**. See Ergot.
- Ergosterin**. See Ergot.
- ERGOT** (*General Subject*).
- Ergot Gangrene**. See Wounds (Septic); Gangrene.
- Ergotic Acid**. See Ergot.
- Ergotine**. See Ergot.
- Ergotinic Acid**. See Ergot.
- Ergotinine**. See Ergot.
- Ergotinol**. See Ergot.
- Ergotism**. See Ergot—Toxic Foods; Grain Poisoning.
- Erosions**. See Europhen; Wounds—Syphilis; Initial Lesion.
- Erosions of Cervix Uteri**. See Cervix Uteri, Erosions of (Index).
- Erosions of Stomach**. See Stomach, Diseases of; Gastric Ulcer.
- Erosions of Stomach, Hæmorrhagic**. See Syphilis; General Infection.
- Erosions of Vulva**. See Urinary System, Surgical Diseases of; Gonorrhœa in Women.
- Erotic Dreams**. See Hypnotism; Vicious Habits in Childhood.
- Eruptions**. See Stomach, Diseases of; Carcinoma.
- Eruptions, Acid**. See Hydrochloric Acid; Gastric Disorders.
- Eruptions, Gaseous**. See Stomach, Diseases of; Chronic Gastritis.
- Eruptions, Nervous**. See Stomach, Diseases of; Functional Diseases.
- Eruptions, Sour**. See Silver; Gastro-Intestinal Disorders.
- Eruption, Acneiform**. See Pix Liquida; Poisoning.
- Eruption, Alcohol**. See Erythema Scarlatiniforme.
- Eruption, Amyl-nitrite**. See Dermatitis Medicamentosa.
- Eruption, Antipyrine**. See Antipyrine Eruption (Index).
- Eruption, Antitox.n.** See Diphtheria.
- Eruption, Arnica**. See Dermatitis Venenata.
- Eruption, Arsenic**. See Dermatitis Medicamentosa—Erythema Scarlatiniforme.
- Eruption, Belladonna**. See Belladonna Eruption (Index).
- Eruption, Bullous**. See Bullous Eruption (Index).
- Eruption, Buttercup**. See Dermatitis Venenata.
- Eruption, Calomel**. See Dermatitis Medicamentosa.
- Eruption, Camphor**. See Dermatitis Medicamentosa.
- Eruption, Cannabis Indica**. See Dermatitis Medicamentosa.
- Eruption, Cantharides**. See Dermatitis Venenata.
- Eruption, Capsicum**. See Dermatitis Venenata.
- Eruption, Carbolic Acid**. See Erythema Scarlatiniforme.
- Eruption, Chloral-hydrate**. See Dermatitis Venenata.
- Eruption, Chloroform**. See Dermatitis Medicamentosa.
- Eruption, Chorea**. See Erythema Symptomaticum.
- Eruption, Chrysarobin**. See Dermatitis Venenata.
- Eruption, Cocaine**. See Erythema Medicamentosa.
- Eruption, Copaiba**. See Copaiba Eruption (Index).
- Eruption, Creasote**. See Dermatitis Venenata.
- Eruption, Cubeb**. See Dermatitis Medicamentosa.
- Eruption, Digitalis**. See Dermatitis Medicamentosa.
- Eruption, Diphtheria**. See Diphtheria Eruption (Index).
- Eruption during Pregnancy**. See Dermatitis Herpetiformis.
- Eruption, Eczematous**. See Eczematous Eruption (Index).
- Eruption, Erythematous**. See Erythematous Eruption (Index).
- Eruption, Hæmorrhagic**. See Hæmorrhagic Eruption (Index).
- Eruption, Hair-dye**. See Erythema Medicamentosa.
- Eruption, Herpetiform**. See Dermatitis Herpetiformis.
- Eruption, Hyoscyamus**. See Dermatitis Medicamentosa.
- Eruption, Iodine**. See Iodine Eruption (Index).
- Eruption, Iodoform**. See Dermatitis Venenata.
- Eruption, Ipecac**. See Dermatitis Venenata.
- Eruption, Mercury**. See Mercury Eruption (Index).
- Eruption, Mustard**. See Dermatitis Venenata.
- Eruption, Nasturtium**. See Dermatitis Venenata.
- Eruption of Labia, Ulcerative**. See Vagina; Vulva; Infectious Vulvitis.
- Eruption, Oil of Turpentine**. See Dermatitis Venenata.
- Eruption, Opium**. See Opium Eruption (Index).
- Eruption, Papular**. See Papular Eruption (Index).
- Eruption, Paraffin**. See Dermatitis Venenata.
- Eruption, Petechial**. See Typhus Fever.
- Eruption, Petroleum**. See Dermatitis Venenata.
- Eruption, Phenacetin**. See Erythema Medicamentosa.
- Eruption, Phlegmonous**. See Dermatitis Medicamentosa.
- Eruption, Phosphoric Acid**. See Dermatitis Medicamentosa.
- Eruption, Pilocarpine**. See Dermatitis Medicamentosa.
- Eruption, Poison-ivy**. See Poison-ivy Eruption (Index).
- Eruption, Poison-oak**. See Poison-oak Eruption (Index).
- Eruption, Poison-sumach**. See Dermatitis Venenata.
- Eruption, Potassium Bromide**. See Dermatitis Medicamentosa.
- Eruption, Potassium Iodide**. See Dermatitis Medicamentosa.
- Eruption, Primrose**. See Erythema Medicamentosum.
- Eruption, Pustular**. See Pustular Eruption (Index).
- Eruption, Quinine**. See Quinine Eruption (Index).

- Eruption, Resorcin. See Dermatitis Venenata.
 Eruption, Rhus Diversiloba. See Dermatitis Venenata.
 Eruption, Rhus Toxicodendron. See Rhus-Toxicodendron Eruption (Index).
 Eruption, Rhus Venenata. See Dermatitis Venenata.
 Eruption, Rose-Colored. See Valvular Diseases of Heart; Acute Endocarditis.
 Eruption, Rubeculous. See Pix Liquida; Poisoning.
 Eruption, Salicylate. See Erythema Scarlatiniforme.
 Eruption, Salicylic Acid. See Salicylic-Acid Eruption (Index).
 Eruption, Salol. See Erythema Medicamentosum.
 Eruption, Scaly. See Scaly Eruption (Index) — Syphilis.
 Eruption, Scarlatiniforme. See Scarlatiniforme Eruption (Index).
 Eruption, Sodium Salicylate. See Dermatitis Medicamentosa.
 Eruption, Stramonium. See Dermatitis Medicamentosa.
 Eruption, Sulphur. See Dermatitis Venenata.
 Eruption, Syphilitic. See Zinc; Cutaneous Disorders.
 Eruption, Tar. See Dermatitis Venenata.
 Eruption, Thapsia. See Dermatitis Venenata.
 Eruption, Tubercular. See Dermatitis Medicamentosa.
 Eruption, Turpentine. See Dermatitis Medicamentosa.
 Eruption, Urticarial. See Urticarial Eruption (Index).
 Eruption, Varioloid. See Iodine; Iodism.
 Eruption, Vesicular. See Vesicular Eruption (Index).
 Eruptive Articular Fever. See Specific Infectious Fevers; Dengue.
 Eruptive Rheumatic Fever. See Specific Infectious Fever; Dengue.
 ERYSIPELAS (*General Subject*). See Aconitine—Actol—Alcohol; Externally—Aluminium; Boratartrate—Atropine; Cutaneous Disorders—Bright's Disease; Acute—Creasote; Septic Diseases—Dermatitis Exfoliativa; Acute—Eczema—Elephantiasis—Erythema Nodosum—Euphen; Cutaneous Disorders—Guaiacol—Hæmaturia—Herpes Zoster—Ichthyol; Cutaneous Disorders—Iodine; Iodoform—Iodine; Skin Disorders—Iron—Jaborandi—Larvngitis; Symptomatic—Phenacetin; Lactophenin—Phenic (Carbolic) Acid—Phenic (Carbolic) Acid; Bromphenol—Phenic (Carbolic) Acid; Trichlorphenol—Picric Acid—Potassium; Soziodolate—Quinine; Inflammation—Resorcin—Resorcin; Resorinol—Rheumatism; Acute—Silver; Cutaneous Disorders—Silver; Unguentum Crédé—Status Lymphaticus; Lymphangitis—Sulphur; Cutaneous Disorders—Thiol—Typhoid Fever—Variola; Vaccinia—Vascular System; Phlegmasia Alba Dolens—Wounds of Head; Wounds of Scalp.
 Erysipelas of Newborn. See Boracic Acid.
 Erysipelas Toxins. See Leprosy—Tumors; Cysts.
 Erysipelatous Inflammation. See Dermatitis Medicamentosa—Vagina; Tumors of Vulva.
 Erysipelatous Inflammation of Scalp. See Wounds of Head; Abscess of Scalp.
 "Erysipeloid" of Rosenbach. See Status Lymphaticus; Lymphangitis.
 ERYTHEMA (*General Subject*). See Antipyrine; Poisoning—Arsenic; Skin Disorders—Belladonna; Cutaneous Disorders—Eczema—Erysine—Erythralmic Goitre—Gout—Leprosy—Respiratory Organs; Nasal Reflex Neuroses—Salicylic Acid—Salicylic Acid; Poisoning—Silver; Cutaneous Disorders—Thiol—Toxic Foods; Grain Poisoning—Zinc; Cutaneous Disorders.
 Erythema Caloricum. See Erythema.
 Erythema Choleraicum. See Erythema Symptomaticum.
 Erythema Diphthericum. See Erythema Symptomaticum.
 Erythema Exudativum Multiforme. See Erythema.
 Erythema Induratum Scrofulosorum. See Erythema.
 Erythema Infantilis. See Erythema.
 Erythema Intertrigo. See Intertrigo.
 Erythema Læve. See Erythema.
 Erythema Medicamentosum. See Erythema.
 Erythema Multiforme. See Dermatitis Herpetiformis—Ichthyol; Cutaneous Disorders—Laryngitis; Symptomatic—Rheumatism; Acute—Strontium; Cutaneous Disorders—Variola; Vaccinia.
 Erythema Neonatorum. See Erythema.
 Erythema Nodosum. See Erythema—Erythema Scrofulosorum—Hydrochloric Acid; Cutaneous Disorders—Laryngitis; Symptomatic—Meningitis; Epidemic Cerebro-Spinal—Quinine; Cutaneous Disorders—Scorbutus, Infantile—Strontium; Cutaneous Disorders.
 Erythema Paratrimma. See Intertrigo.
 Erythema Polymorphous. See Dermatitis Medicamentosa.
 Erythema Scarlatiniforme. See Erythema.
 Erythema Simplex Symptomaticum. See Erythema.
 Erythema, Toxic. See Erythema Multiforme.
 Erythema Traumaticum. See Erythema.
 Erythema Vaccinium. See Erythema Symptomaticum.
 Erythema Venenatum. See Erythema.
 "Erythematous Catarrhal Stomatitis." See Mouth; Catarrhal Stomatitis.
 Erythematous Disorders. See Thiol.
 Erythematous Eruption. See Dermatitis Herpetiformis—Iodine; Iodoform; Untoward Effects—Pix Liquida; Poisoning—Turpentine; Physiological Action.
 Erythematous Rash. See Specific Infectious Fevers; Dengue—Typhoid Fever.
 Erythematous Spots. See Variola.
 Erythematous Syphilide. See Syphilide, Erythematous (Index).
 Erythème Desquamatif Scarlatiniforme Récidivant. See Erythema Scarlatiniforme.
 Erythème Induré des Scrofuloux. See Erythema Nodosum—Erythema Scrofulosorum.
 Erythème Scarlatinoïde. See Erythema Scarlatiniforme.
 Erythème Syphilitiforme. See Intertrigo.
 Erythrol-tetranitrite. See Angina Pectoris.
 Erythromelalgia. See Acromegaly—Nerves, Peripheral; Functional Disorders.
 ERYTHROXYLON COCA AND COCAINE (*General Subject*).
 Esbach's Test for Albumin. See Albuminuria; Quantitative Tests.
 Escharotic. See Acetic Acid—Arsenic—Creasote—Hydrochloric Acid—Nitric Acid—Phosphoric and Hypophosphorous Acids—Pyrogallol—Silver.
 Esencia de Calasaya. See Cinchona.
 Eseridine. See Physostigma.
 Eserine. See Alkaloids—Physostigma.
 Eserine Poisoning. See Atropine; Antidotal Uses.
 Eserine Salicylate. See Salicylic Acid.
 Esmarch's Artificial Ischemia. See Fractures; Compound.
 Esmarch's Bandage. See Aneurism—Erythroxyllon Coca; Prolongation of Local Action.
 Esophoria. See Strabismus; Latent.
 Essential Paralysis of Children. See Spinal Cord; Poliomyelitis.
 Estlander's Operation. See Empyema.
 ETHER (*General Subject*). See Catalepsy—Oxygen; Inhalations.
 Ether Anesthesia. See Vascular System; Vascular Obstruction; Fat-embolism.
 Ether, Oxygenated. See Oxygen.
 Etheromania. See Cocainomania.
 Ethmoidal Sinus. Empyema of. See Orbit; Miscellaneous Diseases.
 Ethmoidal Sinus. Inflammation of. See Sinuses.
 Ethmoidal Sinus. Mucocele of. See Orbit; Miscellaneous Diseases.
 Ethmoidal Suppuration. See Sinuses; Antrum.
 Ethmoiditis. See Sinuses, Diseases of.
 Ethyl-bromide. See Bromide of Ethyl.
 ETHYL-CHLORIDE (*General Subject*).
 Ethylene-ethenyl-diamin. See Piperazin; Lysidin.
 Eucalyptol. See Eucalyptus.
 Eucalyptol. See Eucalyptus.
 EUCALYPTUS (*General Subject*). See Ozone.
 Euchinin. See Malarial Fevers.
 EUOPHEN (*General Subject*). See Burns—Iodine and Derivatives—Vascular System; Varix.
 "Eurythrol." See Animal Extracts; Splenic.
 Eustrongylus Gigas. See Parasites.
 Eversion of Foot. See Foot, Eversion of (Index).
 EXALGIN (*General Subject*). See Salicylic Acid.
 Exanthem, Purpuric. See Miliary Fever.
 Exanthem, Rubecula. See Miliary Fever.
 Exanthem, Scarlatiniform. See Miliary Fever.

- Exanthemata. See Calcium—Camphor; Febrile Diseases.
- Exanthematous Fever. See Typhus Fever.
- Excision, Hip-joint. See Hip-joint Disease.
- Excision of Tongue, Kocher's Operation for. See Tongue; Cancer.
- Excitomotor. See Nux Vomica.
- Excoriations. See Bismuth; Locally—Lead; External Applications.
- Excrescences. See Creasote; Tumors.
- Exfoliative Dermatitis. See Dermatitis Exfoliativa.
- Exhaustion, Nervous. See Neurasthenia—Uterus; Inversion.
- EXOPHTHALMIC GOITRE (*General Subject*). See Animal Extracts; Splenic—Animal Extracts; Suprarenal—Animal Extracts; Thymus—Animal Extracts; Thyroid—Digitalis—Erythema Symptomaticum—Goitre—Graves's Disease (Index)—Iodine; Goitre—Myxœdema—Neurasthenia—Strophanthus.
- Exophthalmos. See Exophthalmic Goitre—Mediastinum; Tumors—Nasal Cavities; Sarcoma—Orbit, Diseases of.
- Exophthalmos, Pulsating. See Orbit.
- Exostoses. See Tumors; Connective Tissue.
- Exostoses, Periosteal. See Tumors; Osteomata.
- Exostosis. See Wounds of Head; Tumors of Skull.
- Exostosis of Pelvis. See Syphilis; Period of Sequelæ.
- Exothyropey. See Thyroid Gland; Thyroid Fever.
- Expansile Pulsation of Liver. See Valvular Diseases of Heart; Tricuspid Regurgitation.
- Expectorant. See Ammonium—Apomorphine—Benzoic Acid—Benzoin—Creasote—Cubeb—Grindelia—Ipecac—Lobelia—Naphthalin—Petroleum—Pix Liquida—Salicylic Acid; Ammonium Salicylate.
- Expectoration, Blood-tinged. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
- Expectoration, Gangrenous. See Tumors of Larynx and Lungs; Carcinoma of Lungs.
- Expectoration, Muco-Purulent. See Tuberculosis of Lungs; Phthisis Florida.
- Extrophy of Bladder. See Bladder, Extrophy of (Index).
- Extension Apparatus. See Hip-joint Disease.
- EXTERNAL EAR, DISEASES OF THE (*General Subject*).
- External Strabismus. See Strabismus.
- Extirpation of Tubal Sac. See Uterine Adnexa; Inflammation of Tubes.
- Extraction, Cataract. See Cataract.
- Extraction of Lens. See Lens, Diseases of.
- Extradural Hæmorrhage. See Wounds of Head; Diseases Involving Skull.
- Extrahepatic Jaundice. See Jaundice, Obstructive.
- Extra-ocular Muscles, Paralysis of. See Strabismus.
- Extra-uterine Gestation. See Uterine Adnexa; Tumors of Ovaries.
- Extra-uterine Pregnancy. See Pregnancy, Extra-uterine (Index).
- Extravasation, Meningeal. See Wounds of Head; Extradural Hæmorrhage.
- Extravasation of Blood. See Vascular System; Vascular Obstruction; Embolism.
- Extremities, Cramps in. See Cramps in Extremities (Index).
- Extremities, Fornication in. See Toxic Foods; Grain Poisoning.
- Extremities, Œdema of. See Œdema of Extremities (Index).
- Extremities, Paralysis of. See Paralysis of Extremities (Index).
- Exudate, Pelvic. See Pelvic Exudate (Index).
- Exudate, Peritoneal. See Ichthyol; Gynecological Disorders.
- Eye. See Ocular (Index).
- Eye, Abnormalities of. See Deaf-mutism.
- Eye, Anæsthesia of. See Erythroxylon Coca and Cocaine; Topical Administration.
- Eye, Disorders of. See Acromegaly—Alcoholic Neuritis—Atropine—Cerebral Hæmorrhage; Eye-symptoms—Hysteria; Special Sense-organs—Jaborandi; Ophthalmic Disorders.
- Eye, Enucleation of. See Lens, Diseases of.
- Eye, Inflammatory Diseases of. See Animal Extracts; Suprarenal; Ophthalmology.
- Eye, Neuralgia of. See Sinuses; Ethmoiditis.
- Eye, Protrusion of. See Exophthalmos (Index).
- Eyeball, Elongation of. See Myopia.
- Eyeball, Prominence of. See Vascular Diseases of Brain; Thrombosis of Sinuses.
- Eyeball, Protuberant. See Exophthalmic Goitre—Orbit, Diseases of; Exophthalmos—Spinal Cord; Syringomyelia.
- Eyeball, Tension of the. See Tension of the Eyeball, Disorders of.
- Eyelids, Abscess of. See Palpebræ, Diseases of.
- Eyelids, Carcinoma of. See Palpebræ; Tumors.
- Eyelids, Cleft. See Palpebræ; Anomalies.
- Eyelids, Coloboma of. See Palpebræ; Anomalies.
- Eyelids, Diseases of. See Blepharitis—Palpebræ, Diseases of.
- Eyelids, Eczema of. See Palpebræ; Cutaneous Disorders.
- Eyelids, Epithelioma of. See Palpebræ; Tumors.
- Eyelids, Eversion of. See Palpebræ; Ectropion.
- Eyelids, Injuries of. See Palpebræ.
- Eyelids, Inversion of. See Palpebræ; Entropion.
- Eyelids, Neuroses of. See Palpebræ, Diseases of.
- Eyelids, Œdema of. See Bright's Disease—Lacrymal Apparatus; Dacryoadenitis—Stomach, Diseases of; Carcinoma—Strychnine—Sulphonal; Poisoning—Wounds of Head; Diseases Involving Skull.
- Eyelids, Papilloma of. See Palpebræ; Tumors.
- Eyelids, Paralysis of. See Gelsemium; Poisoning—Palpebræ; Ptosis.
- Eyelids, Redness of. See Hyperopia.
- Eyelids, Retraction of. See Exophthalmic Goitre.
- Eyelids, Sarcoma of. See Palpebræ; Tumors.
- Eyelids, Syphilis of. See Palpebræ, Diseases of.
- Eyelids, Tumors of. See Palpebræ, Diseases of.
- Eyelids, Vaccinia of. See Blepharitis.
- Eye-lotions. See Lead; External Applications.
- Eye-muscles, Paralysis of. See Diphtheria—Exophthalmic Goitre.
- Eye Operations, Hæmorrhage in. See Animal Extracts; Suprarenal.
- Eye-stones. See Conjunctiva; Injuries of.
- Eye-strain. See Myopia—Nux Vomica; Nervous Disorders—Strychnine; Nervous Disorders.
- Face, Chapped. See Glycerin.
- Face, Herpes of. See Herpes Facialis (Index).
- Face Presentations. See Parturition, Abnormal.
- Face-powders. See Arsenic; Poisoning—Lead; Chronic Poisoning.
- Facial Atrophy. See Spinal Cord; Syringomyelia.
- Facial Hemiatrophy. See Spinal Cord; Syringomyelia.
- Facial Hemiplegia. See Diabetes Mellitus.
- Facial Muscular Spasm. See Encephalitis; Acute Non-suppurative—Neuralgia; Fifth Pair.
- Facial Neuralgia. See Neuralgia; Fifth Pair.
- Facial Paralysis. See Diphtheria—Encephalitis; Acute Non-suppurative—Exophthalmic Goitre—Head, Injuries of; Cerebral Contusions—Herpes Zoster—Hydrocephalus; Acute—Hysteria; Motor Symptoms—Influenza—Meningitis; Acute Leptomeningitis—Nerves, Peripheral; Facial Paralysis—Nerves, Peripheral; Simple Neuritis—Parotitis; Infectious—Tetanus—Wounds of Head; Wounds of Brain.
- Facial Spasms. See Gelsemium; Spasmodic Disorders.
- Facies Pestica. See Plague.
- Fæcal Accumulation. See Intestines; Tumors—Uterine Adnexa; Tumors of Ovaries.
- Fæcal Impaction. See Obstruction, Intestinal—Oxgall—Urinary System, Diseases of (Surgical); Movable Kidney.
- Fæcal Vomiting. See Obstruction, Intestinal.
- Fæces, Incontinence of. See Spinal Cord; Myelitis—Vagino-Perineal Injuries.
- Fagus Sylvatica. See Creasote.
- Failure of Sight. See Toxic Amblyopia.
- Faintness. See Valvular Diseases of Heart; Aortic Regurgitation—Valvular Diseases of Heart; Aortic Stenosis—Vascular System; Injuries of Blood-vessels; Hæmorrhage—Wounds and Stings; Snake-bites.
- Fairy-ring Mushroom. See Toxic Foods; Edible Mushrooms.
- Falling Sickness. See Epilepsy.
- Fallopian Tubes, Benign Growths of. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Fallopian Tubes, Carcinoma of. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Fallopian Tubes, Cysts of. See Uterine Adnexa; Tumors of Fallopian Tubes.

- Fallopian Tubes, Dermoid Cyst of. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Fallopian Tubes, Disease of. See Peritoneum; Acute Peritonitis.
- Fallopian Tubes, Displacements of. See Uterine Adnexa; Displacements of Ovaries.
- Fallopian Tubes, Enchondromata of. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Fallopian Tubes, Fibrocyst of. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Fallopian Tubes, Fibroma of. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Fallopian Tubes, Inflammation of. See Ichthyol; Gynecological Disorders—Uterine Adnexa.
- Fallopian Tubes, Malformations of. See Uterine Adnexa.
- Fallopian Tubes, Myoma of. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Fallopian Tubes, Papillomata of. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Fallopian Tubes, Polypus of. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Fallopian Tubes, Prolapse of. See Uterine Adnexa; Displacements of Ovaries.
- Fallopian Tubes, Sarcoma of. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Fallopian Tubes, Tumors of. See Uterine Adnexa; Tumors of Fallopian Tubes.
- "False Image." See Strabismus.
- Family Ataxia. See Spinal Cord; Hereditary Ataxia.
- Famine Fever. See Specific Infectious Fevers; Relapsing.
- Paradism. See Stomach, Diseases of; Dilatation.
- Farcy. See Glanders.
- Farcy-buds. See Glanders.
- Farmville Lithia-water. See Lithium.
- Fascia, Contraction of. See Tendons; Contraction of Tendons.
- Fasciæ. See Tendons.
- Fascicular Keratitis. See Keratitis; Phlyctenular.
- Fat-embolism. See Embolism, Fat- (Index).
- Fatigue. See Erythroxyton Coca and Cocaine.
- Fatigæ, Constant. See Spinal Cord; Ataxic Paraplegia.
- Fatty Contracted Kidney. See Bright's Disease; Chronic Exudative.
- Fatty Degeneration of Heart. See Fatty Heart and Obesity—Iron; Cardiac Diseases—Leukæmia; Myelogenous—Myocarditis—Phosphorus; Disorders of Vascular Organs.
- Fatty Degeneration of Internal Organs. See Phosphorus; Poisoning.
- Fatty Degeneration of Liver. See Liver; Fatty.
- Fatty Heart. See Erythroxyton Coca and Cocaine—Mercury; Chlorides.
- FATTY HEART AND OBESITY (*General Subject*).
- Fatty Infiltration of Heart. See Fatty Heart and Obesity.
- Fatty Infiltration of Liver. See Liver; Fatty.
- Fatty Liver. See Liver.
- Fatty Stools. See Nursing; Unsuccessful.
- Fatty Tumors of Scalp. See Wounds of Head; Tumors of Scalp.
- Fatty Urine. See Parasites; Filaria.
- Favus. See Euphorbia; Cutaneous Disorders—Phenic (Carbolic) Acid; Cutaneous Disorders—Thiol.
- "Feather-splashes." See Bright's Disease; Non-exudative Chronic.
- Febrifuge. See Potassium—Quebracho.
- Febris Biliaris. See Malarial Fevers; Malarial Hæmaturia.
- Feeble-minded. See Insanity; Idiocy.
- Feet, Fornication in. See Valerian; Physiological Action.
- Feet, Hyperidrosis of. See Salicylic Acid—Sodium; Cutaneous Disorders.
- Feet, Edema of. See Cirrhosis of Liver; Portal—Specific Infectious Fevers; Relapsing—Stomach, Diseases of; Carcinoma.
- Feet, Perspiration of. See Feet, Hyperidrosis of (Index)—Lead; External Application—Manganese; External Uses—Naphthalin; Cutaneous Disorders—Orthopædic Surgery; Pes Planus.
- Fehling's Test. See Diabetes Mellitus.
- Fehr's Test. See Acetonuria.
- Feigning. See Hysteria.
- Fel Bovis. See Ox-gall.
- Fel Tauri. See Ox-gall.
- Felons. See Chloral—Linum—Mercury; Nitrates—Potassium; Caustics—Silver; Surgical Disorders—Spinal Cord; Syringomyelia—Tendons; Tenosynovitis—Wounds (Septic); Carbolic-Acid Gangrene.
- Femoral Aneurism. See Aneurism.
- Femoral Hernia. See Hernia.
- Femoral Vein, Varix of. See Hernia; Femoral.
- Femur, Dislocations of. See Dislocations.
- Femur, Fractures of. See Fractures.
- Femur, Fractures of Neck of. See Hip-joint Disease.
- Femur, Sarcoma of. See Hip-joint Disease.
- Femur, Tumors of. See Hip-joint Disease.
- Fermentation, Gastric. See Gastric Fermentation (Index).
- Fermentation, Intestinal. See Intestinal Fermentation (Index).
- Fermentation Test for Sugar. See Diabetes Mellitus.
- Ferraro's Operation for Hernia. See Hernia; Inguinal.
- Ferratin. See Iron.
- Ferropyrin. See Iron.
- Ferrum. See Iron.
- Fever. See Acetanilid—Aconite—Alcohol—Ammonium; Acetate—Analgæ—Antipyrine—Benzanilid—Bromides—Cajuput-oil—Camphor—Chloral—Cinnamon—Coffee; Caffeine—Erythroxyton Coca and Cocaine—Gelsemium—Guaiaicol—Hydrochloric Acid—Insanity—Ipecac; Skin Disorders—Jaborandi—Mercury; Chlorides—Phenocoll—Potassium; Febrifuges.
- Fever and Ague. See Malarial Fevers.
- Fever, Intermittent. See Malarial Fevers.
- Fever-blister. See Herpes Facialis—Herpes Labialis.
- Fibrillary Tremor of Tongue. See Nerves, Peripheral; Localized Neuritis.
- Fibrinous Bronchitis. See Bronchitis.
- Fibrinous Pneumonia. See Pneumonia, Lobar.
- Fibrocyst of Fallopian Tube. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Fibroid of Vagina. See Vagina; Non-cystic Growths.
- Fibroid Phthisis. See Tuberculosis of Lungs.
- Fibroid Polypus. See Uterus; Inversion.
- Fibroid, Subserous Uterine. See Uterine Adnexa; Tumors of Ovaries.
- Fibroid, Uterine. See Uterine Fibroids (Index).
- Fibroma. See Elephantiasis—Tumors.
- Fibroma, Nasal. See Nasal Cavities; Tumors.
- Fibroma of Auricle. See External Ear; Growths.
- Fibroma of Cornea. See Cornea; Tumors.
- Fibroma of Fallopian Tube. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Fibroma of Gums. See Jaws; Eplulis.
- Fibroma of Intestines. See Intestines; Tumors.
- Fibroma of Kidney. See Urinary System, Diseases of (Surgical); Tumors of Kidney.
- Fibroma of Larynx. See Tumors of Larynx and Lungs; Larynx.
- Fibroma of Liver. See Liver; Tumors.
- Fibroma of Maxillary Gland. See Salivary Glands; Tumors.
- Fibroma of Naso-pharynx. See Naso-pharynx; Tumors.
- Fibroma of Parotid Gland. See Salivary Glands; Tumors.
- Fibroma of Penis. See Penis and Testicles; Tumors.
- Fibroma of Pharynx. See Tonsils; Tumors.
- Fibroma of Pleura. See Pleura; New Growths.
- Fibroma of Rectum. See Tumors of Rectum and Anus; Benign.
- Fibroma of Round Ligament. See Vagina; Tumors of Vulva.
- Fibroma of Scalp. See Wounds of Head; Tumors of Scalp.
- Fibroma of Spinal Cord. See Spine, Diseases of; Tumors.
- Fibroma of Suprarenal Capsules. See Suprarenal Capsules; Tumors.
- Fibroma of Testicles. See Penis and Testicles; Tumors of Testicles.
- Fibroma of Thyroid Gland. See Goitre.
- Fibroma of Tongue. See Tongue; Tumors.
- Fibroma, Soft. See Tumors.
- Fibromyoma. See Tumors; Myxomata.
- Fibromyoma of Ovary. See Uterine Adnexa; Tumors of Ovaries.

- Fibromyoma, Uterine.** See Uterine Fibromyoma (Index).
- Fibromyomata of Naso-pharynx.** See Naso-pharynx; Tumors.
- Fibrosarcoma of Ovary.** See Uterine Adnexa; Tumors of Ovaries.
- Fibrosis, Vascular.** See Pulmonary Circulation; Hemorrhage.
- Fibrous Myocarditis.** See Myocarditis; Chronic.
- Fibrous Odontome.** See Tumors; Connective Tissue.
- Fibrous Tumors.** See Tumors; Connective Tissue.
- Fibula, Dislocations of.** See Dislocations.
- Fibula, Fracture of.** See Fractures.
- Fig-wart.** See Surgical Diseases of the Skin and its Appendages; Verruca.
- Filamentary Keratitis.** See Keratitis; Striate.
- Filaria.** See Parasites.
- Filaria Chyluria.** See Parasites; Filaria.
- Filaria Diurna.** See Parasites; Filaria.
- Filaria Medinensis.** See Parasites; Filaria.
- Filaria Nocturna.** See Parasites; Filaria.
- Filaria Perstans.** See Parasites; Filaria.
- Filaria Sanguinis Hominis.** See Chyluria — Elephantiasis — Hamaturia — Parasites; Filaria — Status Lymphaticus; Lymphangiectasis.
- Filariasis.** See Parasites; Filaria.
- Filic Acid.** See Male Fern.
- Filix Mas.** See Male Fern.
- Fingers, Analgesia of.** See Spinal Cord; Syringomyelia.
- Fingers, Atrophy of Muscles of.** See Spinal Cord; Syringomyelia.
- Fingers, Clubbing of.** See Pleurisy; Chronic — Valvular Diseases of Heart; Pulmonary Stenosis.
- Fingers, Dislocations of.** See Dislocations.
- Fingers, Gangrene of.** See Phenic (Carbolic) Acid Poisoning — Tendons; Tenosynovitis — Wounds (Septic) and Gangrene.
- Fingers, Parasthesiæ of.** See Spinal Cord; Syringomyelia.
- Fingers, Paralytic Feelings in.** See Influenza.
- Fingers, Webbed.** See Orthopædic Surgery.
- Finsen Apparatus.** See Tuberculosis of Skin; Lupus Vulgaris.
- Fir, Balm of Gilead.** See Turpentine.
- Fir, Balsam of.** See Turpentine.
- Fish Poisoning.** See Toxic Foods; Shell-fish Poisoning.
- Fish Tape-worm.** See Parasites; Tape-worms; Botriocephalus.
- Fissure.** See Europhen; Wounds.
- Fissure Anal.** See Anal Fissure (Index).
- Fissures of Lips.** See Lips, Fissures of (Index).
- Fissures of Nipple.** See Nipples, Fissured (Index).
- Fissures of Rectum.** See Silver; Surgical Disorders.
- Fissures of Tongue.** See Silver; Surgical Disorders.
- Fistula.** See Creasote; Ulcerations — Europhen; Wounds — Hydrogen Dioxide; Purulent Affections — Osseous System; Bone Tuberculosis — Salol — Silver; Unguentum Credé.
- Fistula, Abdominal.** See Cholelithiasis.
- Fistula, Anal.** See Anal Fistula (Index).
- Fistula, Duodenal.** See Cholelithiasis.
- Fistula, Entero-Vaginal.** See Vagina; Fistulæ.
- Fistula, Gastric.** See Stomach, Surgery of; Gastrostomy.
- Fistula, Hepatico-Bronchial.** See Cholelithiasis.
- Fistula in Ano.** See Anal Fistula (Index).
- Fistula, Lacrymal.** See Lacrymal Apparatus; Secretory Apparatus.
- Fistula, Lumbar.** See Urinary System, Diseases of (Surgical); Uretrectomy.
- Fistula, Recto-Vesical.** See Stomach, Surgery of; Intestines; Enterotomy.
- Fistula, Renal.** See Urinary System, Diseases of (Surgical); Nephrectomy.
- Fistula, Tuberculous.** See Iodine; Iodoform.
- Fistula, Ureteral.** See Ureteral Fistula (Index).
- Fistula, Uretero-Uterine.** See Urinary System, Diseases of (Surgical); Uteral Implantation.
- Fistula, Uretero-Utero-Vaginal.** See Vagina; Fistulæ.
- Fistula, Uretero-Vaginal.** See Uretero-Vaginal Fistula (Index) — Vagina; Fistulæ.
- Fistula, Urinary.** See Cholelithiasis.
- Fistula, Vaginal.** See Vagina; Fistulæ.
- Fistula, Vesical.** See Vagina; Fistula.
- Fistula, Vesico-Vaginal.** See Vesico-Vaginal Fistula (Index).
- Fits, Epileptiform.** See Wounds of Head; Wounds of Brain.
- Fixation.** See Fractures.
- Fixation of Uterus.** See Uterine Adnexa; Inflammation of Tubes.
- Fixing Eye.** See Strabismus.
- Flagellate Bodies.** See Malarial Fevers.
- Flagellation.** See Malarial Fevers.
- Flap-splitting Operation.** See Vagino-Perineal Injuries.
- Flashes of Heat.** See Menopause; Disorders of Circulation — Thyroid Gland; Thyroid Fever.
- Flashes of Light.** See Valvular Diseases of Heart; Aortic Regurgitation.
- Flat-foot.** See Orthopædic Surgery; Knock-knees — Orthopædic Surgery; Pes Planus — Spine, Diseases of; Scoliosis.
- Flatulence.** See Chamomile — Mentha — Nux Vomica; Gastro-Intestinal — Stomach, Diseases of; Gastric Ulcer — Turpentine.
- Flatulence, Infantal.** See Mentha — Nursing and Artificial Feeding; Special Modifications — Nursing and Artificial Feeding; Unsuccessful Nursing.
- Flatulent Colic.** See Colic, Flatulent (Index).
- Flatulent Dyspepsia.** See Dyspepsia, Flatulent (Index).
- Flaxseed.** See Linum.
- Flaxseed Poultice.** See Linum.
- Flaxseed-tea.** See Linum.
- Flea-bites.** See Dermatitis Venenata — Wounds and Stings.
- Flechsigg's Method.** See Epilepsy.
- Fleming's Tincture.** See Aconite.
- Floating Bodies in Joints.** See Joints; Loose Bodies in.
- Floating Kidney.** See Urinary System, Diseases of (Surgical).
- Floating Liver.** See Liver; Displacements.
- Flowers of Sulphur.** See Sulphur.
- Fluorescein.** See Resorcin; Resorcin-phthalein.
- Fluoroscope.** See Tuberculosis of Lungs; Roentgen Rays.
- Flushes.** See Menopause; Disorders of Circulation.
- Flushing.** See Erythema Simplex — Exophthalmic Goitre — Nitrites; Poisoning.
- Fluxes, Intestinal.** See Intestinal Fluxes (Index).
- Fly-amanita.** See Toxic Foods; Poisonous Mushrooms.
- Flying Blister.** See Cantharides.
- Fœtal Rickets.** See Infantal Myxœdema.
- Fœtal Uterus.** See Uterus; Malformations.
- Fœtid Bronchitis.** See Bronchitis — Bronchiectasis.
- Fœtid Discharge from Nose.** See Wounds of Head; Diseases Involving Skull.
- Fœtus, Abnormally Large.** See Parturition, Abnormal.
- Fœtus, Abnormally Small.** See Parturition, Abnormal.
- Fœtus, Malpresentation of.** See Parturition, Abnormal.
- Follicular Angina.** See Angina, Follicular (Index).
- Follicular Apoplexy.** See Uterine Adnexa; Acquired Malformations of Ovaries.
- Follicular Conjunctivitis.** See Conjunctiva.
- Follicular Cysts of Ovary.** See Uterine Adnexa; Tumors of Ovaries.
- Follicular Impetigo.** See Europhen; Cutaneous Disorders.
- Follicular Odontome.** See Tumors; Connective Tissue.
- Follicular Pharyngitis.** See Pharyngitis, Follicular (Index).
- Follicular Stomatitis.** See Mouth; Aphthous Stomatitis.
- Follicular Tonsillitis.** See Tonsillitis, Follicular (Index).
- Follicular Ulceration of Rectum.** See Rectum and Anus; Non-malignant Ulceration.
- Folliculitis, Impetigo.** See Europhen; Cutaneous Disorders.
- Fomentations.** See Blepharitis.
- Food, Peptonized.** See Peptonized Foods (Index).
- Food, Regurgitation of.** See Regurgitation of Food (Index).
- Foods, Toxic.** See Toxic Foods.
- Foot-and-Mouth Disease.** See Laryngitis; Symptomatic — Mouth and Lips, Diseases of.
- Foot, Club-** See Club-foot (Index).
- Foot, Eversion of.** See Dislocations; Astragalus — Dislocations: Hip — Fractures.

- Foot, Flat-. See Flat-foot (Index).
 Foot, Fractures of. See Fractures.
 Foot, Hollow. See Orthopædic Surgery; Pes Cavus.
 Foot, Inversion of. See Dislocations; Astragalus—Dislocations; Hip—Fractures; Femur—Fractures; Leg.
 Foot, Pain in. See Orthopædic Surgery; Pes Planus.
 Foot, Paralysis of Extensors of. See Diabetes Mellitus.
 Foot, Perforating Ulcer of. See Locomotor Ataxia; Trophic Symptoms.
 Foot, Pronated. See Orthopædic Surgery; Pes Planus.
 Foot, Tumor of. See Wounds and Stings; Jigger.
 Foot-drop. See Beriberi—Nerves, Peripheral; Multiple Neuritis.
 Foramen of Winslow. Hernia into. See Hernia; Rare Forms.
 Forceps, Axis-Traction. See Parturition, Abnormal.
 Forceps Delivery. See Parturition, Abnormal.
 Forceps, Laplace's Anastomotic. See Stomach, Surgery of; Intestines; Anastomosis.
 Forcible Reduction. See Spine, Diseases of; Tuberculosis.
 Forehead, Neuralgia of. See Sinuses; Ethmoiditis.
 Foreign Bodies in Brain. See Wounds of Head; Diseases Involving Skull.
 Foreign Bodies in Conjunctiva. See Conjunctiva; Injuries.
 Foreign Bodies in Cornea. See Cornea.
 Foreign Bodies in Glottis. See Tracheo-Laryngeal Operations; Tracheotomy.
 Foreign Bodies in Larynx. See Larynx, Foreign Bodies in (Index).
 Foreign Bodies in Vagina. See Vagina.
 Foreign Bodies, Intestinal. See Obstruction, Intestinal.
 Foreign Bodies, Oesophageal. See Oesophagus.
 FORMALDEHYDE (*General Subject*). See Amyliform.
 Formalin. See Formaldehyde.
 Formic Aldehyde. See Formaldehyde.
 Formication. See Strychnine; Physiological Action—Urticaria—Wounds (Septic); Ergot Gangrene.
 Formication in Extremities. See Toxic Foods; Grain Poisoning.
 Formication in Feet. See Valerian; Physiological Action.
 Formication in Hands. See Valerian; Physiological Action.
 Formonitrile. See Hydrocyanic Acid.
 Fourth-Nerve Paralysis. See Strabismus.
 Fourth Ventricle, Hydrocele of. See Tumors; Cyst.
 Fowl Poisoning. See Toxic Foods; Meat Poisoning.
 Fowler's Pressure Probe. See Wounds of Head; Wounds of Brain.
 Fowler's Solution. See Arsenic—Iodine; Iodism—Potassium.
 Fox-glove. See Digitalis.
 FRACTURES (*General Subject*). See Dislocations—Lead; External Application—Osseous System; Fragilitas Ossium—Sodium; Surgical Disorders—Surgical Diseases; Aseptic Fever.
 Fractures, Compound. See Benzoic Acid—Fractures.
 Fractures, Delayed Union of. See Fractures—Phosphorus; Phosphates.
 Fractures of Bones of Thorax. See Fractures—Wounds and Injuries of Thorax; Fractures.
 Fractures of Femur. See Fractures.
 Fractures of Neck of Femur. See Fractures—Hip-joint Disease.
 Fractures of Penis. See Penis and Testicles; Injuries.
 Fractures of Ribs. See Fractures of Ribs (Index).
 Fractures of Skull. See Skull, Fractures of (Index).
 Fractures of Skull, Depressed. See Skull, Depressed Fractures of (Index).
 Fractures of Spine. See Fractures—Spine, Diseases of; Tuberculosis.
 Frænum, Short. See Penis and Testicles, Anomalies of Prepuce.
 Fragilitas Ossium. See Osseous System.
 Frangulin. See Buckthorn.
 Fränkel's Diplococcus Lanceolatus. See Meningitis; Cerebro-Spinal.
 Fränkel's Pneumococcus. See Pneumonia, Lobar.
 Frankincense, Common. See Turpentine.
 Freckles. See Sodium; Cutaneous Disorders—Tumors; Angiomata.
 French Measles. See Rubella.
 Frenkel's Method. See Locomotor Ataxia.
 Friar's Balsam. See Benzoic Acid.
 Friction-rub. See Pleurisy; Acute.
 Friedländer's Bacillus Pneumoniæ. See Pneumonia, Catarrhal—Pneumonia, Lobar.
 Friedrich's Ataxia. See Ataxia, Friedrich's (Index).
 Friedrichshall Spring-Water. See Magnesia; Purgative.
 Frog-face. See Naso-pharynx; Tumors.
 Frontal Abscess. See Sinuses; Frontal.
 Frontal Cephalalgia. See Toxic Foods; Meat Poisoning.
 Frontal Headache. See Specific Infectious Fevers; Dengue.
 Frontal Hernia. See Encephalocele.
 Frontal Sinus, Empyema of. See Orbit; Miscellaneous Disease.
 Frontal Sinus, Inflammation of. See Sinuses.
 Frontal Sinus, Mucocoele of. See Orbit; Miscellaneous Disorders.
 Frost-bite. See Benzoic—Dermatitis Gangrenosa—Ichthyol; Cutaneous Disorders—Quebracho; Topical Uses—Sodium; Cutaneous Disorders—Surgical Diseases of the Skin and its Appendages.
 Fumigation. See Sulphur.
 Fumigation, Calomel. See Diphtheria—Mercury; Chlorides.
 Functional Diseases of Stomach. See Stomach, Diseases of.
 Functional Nervous Atony. See Strychnine; Nervous Disorders.
 Functional Nervous Insomnia. See Sulphonal.
 Fungl. See Tumors.
 Fungus Growths of Vagina. See Vagina; Non-cystic Growths.
 Fungus Cerebri. See Wounds of Head; Fungus—Wounds of Head; Surgery of Lateral Ventricles.
 Fungus Hematodes. See Chronic Acid; Morbid Growths.
 Fungus Hematoides. See Tumors.
 Funnel Breast. See Insanity; Idiocy.
 Furuncle. See Actol—Boils (Index)—Diabetes Mellitus; Skin—Naphthalin; Naphthol-camphor—Petroleum; External Use—Potassium; Chlorate—Salol; Camphorated—Surgical Diseases of the Skin and its Appendages; Carbuncle.
 Furuncle Bacillus. See Blepharitis; Ciliaris.
 Furuncle of Ear. See Ear, Furuncle of (Index).
 Furuncle of Vulva. See Vagina; Tumors of Vulva.
 Furunculosis. See Abscess; Varieties—Ichthyol; Cutaneous Disorders—Mercury; Chlorides—Parasites; Trichina—Silver; Unguentum Crédi—Sulphur; Cutaneous Disorders—Surgical Diseases of the Skin and its Appendages; Furuncle.
 Fused Nitrate of Silver. See Silver.
 Fusel-oil. See Alcohol.
 Fusion-tubes. See Strabismus.
 Gait, Ataxic. See Insanity; General Paresis.
 Gait, High Stepping. See Alcoholic Neuritis—Locomotor Ataxia.
 Gait, Pseudotabetic. See Alcoholic Neuritis.
 Gait, Shuffling. See Insanity; Senile Dementia.
 Gait, Spastic. See Insanity; General Paresis.
 Gait, Waddling. See Osseous System; Osteomalacia.
 Galabius Operation. See Vagino-Perineal Injuries.
 Galactagogue. See Cotton-plant.
 Galactocoele. See Mammary Gland.
 Galactorrhœa. See Mammary Gland.
 Gall-bladder. See Liver; Abscess.
 Gall-bladder, Acute Empyema of. See Liver and Gall-bladder.
 Gall-bladder, Cancer of. See Liver; Tumors of Biliary Tract—Methyl-blue; Malignant Tumors.
 Gall-bladder, Carcinoma of. See Liver; Tumors of Biliary Tract.
 Gall-bladder, Dilated. See Liver; Hydatid Cyst.
 Gall-bladder, Diseases of. See Liver and Gall-bladder.
 Gall-bladder, Distended. See Urinary System, Diseases of (Surgical); Movable Kidney.
 Gall-bladder, Dropsy of the. See Pancreas; Cysts.
 Gall-bladder, Empyema of. See Liver; Abscess—Liver and Gall-bladder.

- Gall-bladder, Enlarged. See Liver; Liver and Gall-bladder—Peritoneum; Tuberculous Peritonitis.
- Gall-bladder, Inflammation of. See Liver; Liver and Gall-bladder.
- Gall-bladder, Lesions of. See Abdomen, Injuries of.
- Gall-bladder, Perforation of. See Liver; Empyema of Gall-bladder.
- Gall-bladder, Rupture of. See Abdomen, Injuries of—Peritoneum; Acute Peritonitis.
- Gall-bladder, Tumors of. See Hydronephrosis.
- Gall-stone Colic. See Cholelithiasis—Liver; Abscess—Pancreas; Calculi—Uterine Adnexa; Tumors of Ovaries.
- Gall-stones. See Cholelithiasis—Insanity—Intestines; Tumors—Liver; Angiocholitis—Liver; Tumors of Biliary Tract—Mercury; Chlorides—Obstruction, Intestinal—Olive-oil—Typhoid Fever; Complications.
- Gallic Acid. See Kino.
- Galloping Consumption. See Tuberculosis of Lungs; Phthisis Florida.
- Galvanism. See Stomach, Diseases of; Dilatation.
- Galvanocautery. See Dermatitis Maligna—Nasal Cavities; Chronic Rhinitis—Nasal Cavities; Septum, Deviations of—Nasal Cavities; Tumors.
- Galvanopuncture. See Aneurism—Tonsils; Hyper trophy.
- Ganglia, Tumors of Great. See Tumors of Brain.
- Ganglion. See Tendons—Tumors; Cysts.
- Ganglioneuroglioma. See Tumors; Gliomata.
- Gangrene. See Aneurism—Diabetes Mellitus; Skin—Ergot; Poisoning—Fractures—Manganese; External Uses—Phenic (Carbolic) Acid; Poisoning—Rheumatism; Acute—Sandal-wood—Scleroderma—Spinal Cord; Syringomyelia—Surgical Diseases of the Skin and its Appendages; Frostbite—Syphilis—Toxic Foods; Grain Poisoning—Variola; Vaccinia—Vascular System; Arteritis—Vascular System; Injuries of Arteries; Contusion—Vascular System; Injuries of Veins—Vascular System; Phlegmia Alba Dolens—Vascular System; Vascular Obstruction; Embolism—Wounds (Septic) and Gangrene—Wounds (Septic) and Gangrene; Septicæmia—Wounds and Stings; Jigger—Wounds and Stings; Snakebites.
- Gangrene, Carbolic Acid. See Wounds (Septic); Carbolic-Acid Gangrene.
- Gangrene, Diabetic. See Wounds (Septic); Diabetic Gangrene.
- Gangrene, Ergot. See Wounds (Septic); Gangrene.
- Gangrène Foudroyante. See Surgical Diseases; Malignant (Edema)—Wounds (Septic); Gangrene—Wounds (Septic) and Gangrene; Septicæmia.
- Gangrène Gazeuse. See Surgical Diseases; Malignant (Edema).
- Gangrene, Hospital. See Nitric Acid; Local Uses.
- Gangrene, Intestinal. See Stomach, Surgery of; Intestines; Resection.
- Gangrene, Moist. See Vascular System; Vascular Obstruction; Thrombosis.
- Gangrene of Finger. See Finger, Gangrene of (Index).
- Gangrene of Lung. See Lung, Gangrene of (Index).
- Gangrene of Spleen. See Spleen; Wandering.
- Gangrene, Pulmonary. See Lung, Gangrene of (Index)—Pulmonary Abscess.
- Gangrene, Traumatic. See Wounds (Septic); Gangrene.
- Gangrenous Dermatitis. See Dermatitis Gangrenosa.
- Gangrenous Emphysema. See Surgical Diseases; Malignant (Edema).
- Gangrenous Expectorations. See Tumors of Larynx and Lungs; Carcinoma of Lungs.
- Gangrenous Intestine. See Hernia; Strangulated.
- Gangrenous Stomatitis. See Mouth.
- Gangrenous Surfaces. See Creasote; Ulcerations.
- Garlic. See Bronchiectasis.
- Gaseous Eructations. See Stomach, Diseases of; Chronic Gastritis.
- Gasserian Ganglion, Removal of. See Keratitis; Neuropathic—Neuralgia.
- Gastein Spring-water. See Gout.
- Gastralgia. See Acetanilid; Neuralgia—Angina Pectoris—Apomorphine—Arsenic; Neuralgia—Belladonna; Gastro-Intestinal Disorders—Colocynthis; Gastro-Intestinal Disorders—Epilepsy—Gastrodynia (Index)—Hydrocyanic Acid; Gastric Disorders—Lead; Gastro-Intestinal Disorders—Menthol; Gastro-Intestinal Disorders—Milk-sickness—Nitroglycerin; Gastro-Intestinal Disorders—Pepsin—Potassium; Antacids—Resorcin—Salicylic Acid—Silver; Silver Chloride—Stomach, Diseases of; Chronic Gastritis—Stomach, Diseases of; Functional—Stomach, Diseases of; Functional; Cardiospasm—Stomach, Diseases of; Functional; Sensory Neuroses—Strontium; Gastro-Intestinal Disorders—Strychnine; Nervous Disorders—Zinc; Gastro-Intestinal Disorders.
- Gastralgokenosis. See Stomach, Diseases of; Functional Diseases.
- Gastrectasia. See Stomach, Diseases of; Dilatation.
- Gastrectomy. See Stomach, Surgery of.
- Gastric. See Stomach (Index).
- Gastric Acidity. See Acidity of Stomach (Index).
- Gastric Amotility. See Stomach, Diseases of; Functional Diseases.
- Gastric Anæsthesia. See Stomach, Diseases of; Functional Diseases.
- Gastric Atony. See Quassia—Stomach, Diseases of; Dilatation—Stomach, Diseases of; Functional.
- Gastric Carcinoma. See Anæmia, Pernicious—Bismuth; Dyspepsia—Hydrochloric Acid; Gastric Disorders—Indicanuria—Intestines; Tumors—Pepsin—Stomach, Cancer of (Index).
- Gastric Catarrh. See Ammonium—Belladonna; Gastro-Intestinal Disorders—Eucalyptus; Gastro-Intestinal Disorders—Gentian—Indicanuria—Nux Vomica; Gastro-Intestinal Disorders—Pancreatin—Pepsin—Salicylic Acid; Bismuth Salicylate.
- Gastric Catarrh, Acute. See Stomach, Diseases of; Acute Gastritis.
- Gastric Catarrh, Chronic. See Resorcin—Stomach, Diseases of; Chronic Gastritis—Strontium; Gastro-Intestinal Disorders.
- Gastric Colic. See Cholelithiasis—Locomotor Ataxia.
- Gastric Crises. See Cerium; Nervous Disorders—Locomotor Ataxia; Tabetic Crises.
- Gastric Dilatation. See Physostigma; Gastro-Intestinal Disorders—Salicylic Acid—Stomach, Dilatation of (Index)—Stomach, Surgery of; Gastropliation.
- Gastric Disorders. See Anæmia, Pernicious—Hernia; Epigastric—Naso-pharynx; Chronic Nasopharyngitis—Nerves, Peripheral; Localized Neuritis—Wounds (Septic); Ergot Gangrene.
- Gastric Fermentation. See Bismuth; Dyspepsia—Sodium—Gastro-Intestinal Disorders—Strontium; Gastro-Intestinal Disorders.
- Gastric Fistula. See Stomach, Surgery of; Gastrotomy.
- Gastric Hæmorrhage. See Hæmatemesis (Index)—Resorcin—Stomach, Diseases of; Gastric Ulcer—Stomach, Hæmorrhage from (Index)—Stomach, Surgery of; Gastrotomy—Stomach, Surgery of; Ulcer.
- Gastric Hyperacidity. See Ammonia—Hydrochloric Acid—Stomach, Hyperacidity of (Index).
- Gastric Hyperæsthesia. See Stomach, Diseases of; Functional Diseases.
- Gastric Hypermotility. See Stomach, Diseases of; Functional Diseases.
- Gastric Inacidity. See Stomach, Diseases of; Functional Diseases.
- Gastric Indigestion. See Sodium; Gastro-Intestinal Disorders.
- Gastric Irritability. See Pepsin.
- Gastric Lavage. See Lavage (Index).
- Gastric Neuritis. See Neuritis, Gastric (Index).
- Gastric Neuroses. See Cannabis Indica; Digestive Disorders—Stomach, Diseases of; Carcinoma—Stomach, Diseases of; Chronic Gastritis—Stomach, Diseases of; Functional Diseases.
- Gastric Perforation. See Stomach, Diseases of; Gastric Ulcer.
- Gastric Subacidity. See Stomach, Diseases of; Functional Diseases.
- Gastric Syphilis. See Syphilis; General Infection.
- Gastric Tumor. See Stomach, Diseases of; Carcinoma.
- Gastric Ulcer. See Anorexia Nervosa—Belladonna; Gastro-Intestinal Disorders—Bismuth—Chlorosis—Herpes Facialis—Indicanuria—Intestines; Duodenum; Ulceration—Intestines; Tumors—Liver; Abscess—Orthoform—Pancreatin—Pepsin—Resorcin—Silver; Gastro-Intestinal Disorders—Stomach, Diseases of; Ulcer—Stomach, Diseases of; Carcinoma—Stomach, Diseases of; Chronic Gastritis—Stomach, Diseases of; Func-

- Gastric Ulcer.
 tional; Hyperchlorhydria—Stomach, Diseases of;
 Toxic Gastritis.
- Gastric Ulcer, Perforating. See Pancreas; Acute
 Pancreatitis.
- Gastric Ulcer, Ruptured. See Peritoneum; Acute
 Peritonitis.
- Gastric Ulcer, Surgical Treatment of. See Stomach,
 Surgery of.
- Gastritis. See Herpes Facialis—Insanity—Lead;
 Gastro-Intestinal Disorders—Linum—Quinine;
 Contra-indications—Veratrum Viride.
- Gastritis, Acid. See Acid Gastritis (Index).
- Gastritis, Acute. See Stomach, Diseases of—Stron-
 tium; Gastro-Intestinal Disorders.
- Gastritis, Atrophic. See Stomach, Diseases of;
 Chronic Gastritis.
- Gastritis, Catarrhal. See Salicylic Acid.
- Gastritis, Chronic. See Silver; Gastro-Intestinal
 Disorders—Stomach, Diseases of—Stomach, Dis-
 eases of; Carcinoma.
- Gastritis, Mucous. See Stomach, Diseases of;
 Chronic Gastritis.
- Gastritis, Phlegmonous. See Stomach, Diseases of.
- Gastritis, Purulent. See Stomach, Diseases of.
- Gastritis, Subacid. See Stomach, Diseases of;
 Chronic Gastritis.
- Gastritis, Toxic. See Stomach, Diseases of.
- Gastro-anastomosis. See Stomach; Surgery of;
- Gastro-gastrostomy.
- Gastrochylorrhœa. See Stomach, Diseases of;
 Functional Diseases.
- Gastrohynia. See Cerium; Gastric Disorders—Crea-
 sote; Gastro-Intestinal Disorders—Manganese;
 Gastric Disorders.
- Gastro-enteritis. See Arsenic; Physiological Action
 —Colchicum; Physiological Action—Creasote;
 Gastro-Intestinal Disorders—Hydrochloric Acid;
 Gastric Disorders—Hydrochloric Acid; Poisoning
 —Infants, Diarrhœal Diseases of—Liver; Con-
 gestion—Middle Ear; Acute Purulent Otitis—
 Phenic (Carbolic) Acid; Poisoning—Podophyl-
 lum; Poisoning—Potassium; Poisoning—Pseudo-
 leukemia—Quinine; Tonic—Salicylic Acid; Cal-
 cium Salicylate—Silver; Poisoning; Acute—So-
 dium; Poisoning—Toxic Foods; Grain Poisoning
 —Wounds (Septic) and Gangrene; Septicæmia.
- Gastro-enteritis, Acute. See Toxic Foods; Cream
 Poisoning—Toxic Foods; Meat Poisoning.
- Gastro-enterostomy. See Stomach, Surgery of;
 Ulcer—Stomach, Surgery of; Pyloroplasty.
- Gastro-gastrostomy. See Stomach; Surgery of.
- Gastro-Intestinal Catarrh. See Zinc; Physiological
 Action—Zinc; Poisoning.
- Gastro-Intestinal Catarrh, Acute. See Infants,
 Diarrhœal Diseases of.
- Gastro-Intestinal Catarrh, Chronic. See Hydrastis;
 Catarrhal Disorders.
- Gastro-Intestinal Diseases. See Sulphur.
- Gastro-Intestinal Disorders. See Colocynthis—Nux
 Vomica—Silver—Sodium—Strontium—Strychnine
 —Zinc.
- Gastro-Intestinal Disorders, Functional. See Hyp-
 notism.
- Gastro-Intestinal Irritation. See Strophanthus;
 Poisoning.
- Gastro-Intestinal Protective. See Petroleum.
- Gastrolysis. See Stomach; Surgery of.
- Gastropepy. See Stomach; Surgery of.
- Gastroplasty. See Stomach; Surgery of; Gastro-
 gastrostomy.
- Gastroplification. See Stomach; Surgery of.
- Gastroptosis. See Stomach, Diseases of—Stomach,
 Diseases of; Dilatation—Stomach; Surgery of;
 Gastropepy.
- Gastrorrhaphy. See Stomach; Surgery of; Gastrop-
 lication.
- Gastrostomy. See Stomach; Surgery of.
- Gastrosuccorrhœa Continua Chronica. See Stomach,
 Diseases of; Functional Diseases.
- Gastrosuccorrhœa Periodica. See Stomach, Dis-
 eases of; Functional Diseases.
- Gastrostomy. See Stomach; Surgery of.
- Gastroxyntsis. See Stomach, Diseases of; Func-
 tional; Gastrosuccorrhœa.
- "Gatherings in the Ear." See Middle Ear; Chronic
 Otitis.
- GAULTHERIA (*General Subject*).
- Gaultheria Procumbens. See Salicylic Acid.
- Gaultherilen. See Gaultheria.
- Gelatin Dressing. See Eczema.
- Gelatin Injections. See Aneurism.
- Gelatinous Arthritis. See Joints; Tubercular.
- Gelsemic Acid. See Gelsemium.
- Gelsemin. See Gelsemium.
- Gelseminic Acid. See Gelsemium.
- Gelseminine. See Gelsemium.
- GELSEMIUM (*General Subject*).
- General Adenopathy. See Syphilis; Primary Local
 Changes from Infection.
- General Lymphadenoma. See Pseudoleukæmia.
- General Paralysis of the Insane. See Insanity; Gen-
 eral Paresis.
- General Paresis. See Paresis, General (Index).
- Genital Herpes. See Herpes Genitalis.
- Genito-Urinary Disorders. See Strontium.
- Genito-Urinary Inflammations. See Corn-ergot and
 Corn-silk.
- GENTIAN (*General Subject*).
- Gentiana Quinquiflora. See Gentian.
- Gentianic Acid. See Gentian.
- Genticic Acid. See Gentian.
- Genu Valgum. See Orthopædic Surgery; Knock-
 knee.
- Genu Varum. See Orthopædic Surgery; Bow-legs.
- German Measles. See Measles—Rubella.
- Germicide. See Eucalyptus—Hydrogen Dioxide—
 Mercury—Methylene-blue—Naphthol—Salicylic
 Acid; Ammonium Salicylate—Salicylic Acid;
 Sodium Dithiosalicylate.
- Gestation, Ectopic. See Pregnancy, Disorders of—
 Pregnancy, Extra-uterine (Index)—Uterine Ad-
 nexa; Tumors of Ovaries.
- Gestation, Extra-uterine. See Pregnancy; Extra-
 uterine (Index)—Uterine Adnexa; Tumors of
 Ovaries.
- Gestation, Rupture of Ectopic. See Uterine Adnexa;
 Tumors of Ovaries.
- Giant-Cell Sarcoma. See Tumors; Connective Tis-
 sue.
- Giantism. See Acromegaly.
- Giddiness. See Sulphonal; Poisoning.
- Gigantocytes. See Anæmia, Pernicious.
- Gin. See Alcohol—Juniper.
- Gin-drinker's Liver. See Cirrhosis of the Liver;
 Portal.
- Gingivitis. See Phenic (Carbolic) Acid; Aseptol.
- Girdle Sensation. See Locomotor Ataxia.
- Girdle Symptoms. See Spinal Cord; Myelitis.
- Girdner's Telephone-probe. See Wounds of Head;
 Gunshot Wounds.
- Gland, Thymus. See Thymus Gland (Index).
- Gland-cysts. See Tumors; Cysts.
- GLANDERS (*General Subject*). See Creasote; Septic
 Diseases—Mercury; Metallic—Sulphur; Fumiga-
 tion.
- Glands, Enlarged Bronchial. See Hydrocephalus;
 Acute—Pertussis.
- Glands, Enlarged Cervical. See Aneurism; Carotid
 —Specific Infectious Fevers; Glandular.
- Glands, Enlarged Lymphatic. See Lymphatic
 Glands, Enlarged (Index).
- Glands, Enlargement of Mesenteric. See Status
 Lymphaticus.
- Glands, Enlargement of Superficial. See Status
 Lymphaticus.
- Glands, Inflammation of. See Adenitis—Linum.
- Glands, Lymphatic, Enlarged. See Lymphatic
 Glands; Enlarged (Index).
- Glands, Non-suppurating Enlarged. See Phenic
 (Carbolic) Acid; Surgical Disorders.
- Glands, Swollen. See Belladonna; External Uses.
- Glandular Enlargement in Neck. See Tumors of
 Larynx and Lungs; Carcinoma of Larynx.
- Glandular Enlargements. See Iodine; Scrofulosis—
 Sulphur; Cutaneous Disorders.
- Glandular Fever. See Specific Infectious Fevers;
 Relapsing.
- Glandular Laryngitis. See Laryngitis; Chronic.
- Glans, Syphilitic Vegetations of. See Iron; Local
 Uses.
- Glass, Soluble. See Sodium.
- Glauber's Salt. See Sodium.
- Glaucoma. See Animal Extracts; Suprarenal; Oph-
 thalmology—Iris; Iritis—Iris; Tumors—Keratis-
 tis—Lens; Anomalies of Position—Physostigma;
 Ophthalmic Disorders—Tension of Eyeball.
- Gleet. See Creasote; Venereal Diseases—Cubeb;
 Catarrhal Disorders—Gonorrhœa (Index)—Juni-
 per; Genito-Urinary Disorders—Turpentine.
- Glénard's Disease. See Stomach, Diseases of; Gas-
 troptosis—Stomach, Surgery of; Gastropepy.

- Glioma. See Tumors—Tumors; Gliomata.
 Glioma of the Retina. See Optic Nerve and Retina.
 Glissonian Cirrhosis. See Cirrhosis of the Liver; Secondary.
 Globulinuria. See Albuminuria.
 Globus Hystericus. See Hysteria—Rabies.
 Glonoin. See Nitroglycerin.
 Glossal Paralysis. See Diphtheria.
 Glossitis. See Specific Infectious Fevers; Relapsing—Tongue.
 Glosso-pharyngeal Nerve, Neuritis of. See Nerves, Peripheral; Localized Neuritis.
 Glottis, Oedema of. See Iodine; Iodism—Laryngitis.
 Glottis, Foreign Bodies in. See Tracheo-Laryngeal Operations; Tracheotomy.
 Glucose in Urine. See Urine, Glucose in (Index).
 Gluteal Aneurism. See Hip-joint Disease.
 GLYCERIN (*General Subject*). See Potassium; Chlorate.
 Glycerin Enemata. See Constipation.
 Glycerinum. See Glycerin.
 GLYCOSURIA (*General Subject*). See Cerebral Hæmorrhage—Diabetes Mellitus—Exophthalmic Goitre—Glycerin—Jambul; Diabetes—Male Fern; Poisoning—Myxœdema—Naphthalin; Urinary Disorders—Neurasthenia—Pancreas; Calculi—Pancreas; Tumors—Tumors of Brain; Tumors of Pons.
 Glycostria, Alimentary. See Diabetes Mellitus—Glycosteria.
 Glycyrrhiza. See Licorice.
 Gmelin's Test. See Choloria—Jaundice.
 Gnoscopine. See Opium.
 Goa Powder. See Chrysarobin.
 GOITRE (*General Subject*). See Animal Extracts; Thyms—Animal Extracts; Thyroid—Asthma—Ether; Contra-indications—Exophthalmic Goitre—Infantile Myxœdema—Iodine—Potassium; Osmate.
 Goitre, Exophthalmic. See Exophthalmic Goitre (Index)—Graves's Disease (Index).
 GOLD (*General Subject*).
 Golden Seal. See Hydrastis.
 Goldthwaite's Apparatus. See Spine, Diseases of; Tuberculosis.
 Gonococcus. See Rheumatism; Gonorrhœal—Urinary System, Surgical Diseases of; Gonorrhœa.
 Gonorrhœa. See Aiol—Aluminium; Borotartarate—Alumol; Gynæcology—Argonin—Benzoic Acid—Boracic Acid—Cannabis Indica; Renal and Urinary Maladies—Cannabis Indica; Reproductive Organs—Cinnamon; Antiseptic—Colchicum; General Maladies—Copaiba—Copper; Genito-Urinary Diseases—Creasote; Venereal Diseases—Cubeb; Catarrhal Disorders—Digitalis; Anaphrodisiac—Eucalyptus; Genito-Urinary Disorders—Formaldehyde; Gynæcological Disorders—Gleet (Index)—Hydrogen Dioxide; Purulent Affections—Ichthyol; Genito-Urinary Disorders—Kino—Krameria—Lead; External Applications—Manganese; External Uses—Mercury; Chlorides—Methylene-blue—Orthoform—Potassium; Antacids—Potassium; Sozoiodolate—Resorcin; Hydroquinone—Rheumatism; Acute—Rheumatism; Chronic Articular—Rheumatism; Gonorrhœal—Salicylic Acid; Mercuric Salicylate—Salol—Sandal-wood—Silver; Argentamin—Silver; Largin—Silver; Protargol—Silver; Silver Citrate—Sodium; Genito-Urinary Disorders—Syphilis; Infectious Sections—Urinary System, Surgical Diseases of—Vagina; Vulva; Infectious Vulvitis—Zinc; Catarrhal Disorders.
 Gonorrhœa, Rectal. See Mercury; Chlorides.
 Gonorrhœal Endometritis. See Alumol; Gynæcology.
 Gonorrhœal Ophthalmia. See Ophthalmia, Gonorrhœal (Index).
 Gonorrhœal Rheumatism. See Rheumatism, Gonorrhœal (Index).
 Gonorrhœal Vaginitis. See Vagina; Infectious Vaginitis.
 Gonorrhœal Vulvitis. See Vulvitis, Gonorrhœal (Index).
 Gooch's Splint. See Fractures.
 Goose Poisoning. See Toxic Foods; Meat Poisoning.
 Gossypin. See Cotton-plant.
 Gossypium Herbaceum. See Cotton-plant.
 Gottstein's Curette. See Naso-pharynx; Adenoids.
 GOUT (*General Subject*). See Benzoic Acid—Bromides—Cajuput-oil—Colchicum; Rheumatism and Gout—Erythema Multiforme—Erythema Symptomaticum—Guaiac—Ichthyol; Rheumatism—Insanity; Post-febrile—Joints; Gout, Arthritis of—Lithium; Rheumatism and Gout—Magnesia; Antacid—Mentha—Mercury; Iodides—Musk—Nucleins; Contra-indications—Piperazin—Piperazin; Lycetol—Piperazin; Lysidin—Rectum and Anus; Pruritus Ani—Rheumatism; Acute—Rheumatism; Chronic Articular—Salicylic Acid—Salicylic Acid, and the Salicylates—Sodium; Lithæmic Disorders—Strontium—Sulphur; Lithæmic Disorders—Tendons; Bursitis.
 Gouty Disease of Tongue. See Chromic Acid; Antiseptic.
 Gouty Kidney. See Bright's Disease; Non-exudative Chronic.
 Gouty Retinitis. See Optic Nerve and Retina; Retinitis.
 Gouty Sore Throat. See Thiol.
 Gowers's Sign. See Muscles; Dystrophies.
 Graefe's Sign. See Exophthalmic Goitre.
 Graefe's Test. See Strabismus.
 Grafting, Anomalies in. See Skin-grafting.
 Grafting, Skin. See Plastic Surgery.
 Grain Poisoning. See Toxic Foods.
 Granatum. See Pelletierine.
 Grand Mal. See Epilepsy.
 Granular Conjunctivitis. See Conjunctivitis, Granular (Index).
 Granular Lids. See Silver; Ophthalmic Disorders.
 Granular Papilloma of Rectum. See Tumors of Rectum and Anus; Papillomata.
 Granulating Surfaces. See Benzoin; Abrasions.
 Granulations, Luxuriant. See Iodine; Surgical Uses.
 Granuloma, Syphilitic. See Syphilis; Primary Local Changes from Infection.
 Granulomata. See Pseudoleukæmia.
 Gravel. See Benzoic Acid—Corn-ergot and Corn-silk—Digitalis; Urinary Calculi—Lithium; Cystitis.
 Graves's Disease. See Exophthalmic Goitre (Index)—Hyoscyamus.
 Gravimetric Test for Albumin. See Albuminuria.
 Gray Bark. See Cinchona.
 Gray Powder. See Mercury.
 Green Sickness. See Chlorosis.
 Green-Stick Fractures. See Fractures.
 Greenish Coloration of Skin. See Valvular Diseases of Heart; Tricuspid Regurgitation.
 Gregory's Powders. See Rhubarb.
 Greisinger's Syndrome. See Vascular Diseases of Brain; Thrombosis.
 GRINDELIA (*General Subject*).
 Grindeline. See Grindelia.
 Grippe, La. See Influenza.
 Grocer's Itch. See Eczema.
 Growth, Arrested. See Animal Extracts; Thyroid.
 Growths, Malignant. See Zinc; Cutaneous Disorders.
 Growths, Non-cystic. See Vagina.
 Growths of Fallopian Tubes, Benign. See Uterine Adnexa; Tumors of Fallopian Tubes.
 Growths of Pancreas. See Suprarenal Capsules; Tumors.
 Growths of Rectum, Cartilaginous. See Tumors of Rectum and Anus; Enchondromata.
 Growths of Rectum, Malignant. See Tumors of Rectum and Anus.
 Growths of Scalp, Vascular. See Wounds of Head; Tumors of Scalp.
 Growths, Papillomatous. See Syphilis.
 Growths, Retroperitoneal. See Uterine Adnexa; Tumors of Ovaries.
 Grutum. See Surgical Diseases of Skin and its Appendages; Milium.
 GUALAC (*General Subject*). See Gout.
 Guaiac Test. See Hæmaturia; Tests.
 GUALACOL (*General Subject*). See Creasote—Malarial Fevers—Resorcin; Pyrocatechin.
 Guaiacum. See Guaiacol.
 GUARANA (*General Subject*).
 Guaranine. See Guarana.
 Gude's Pepto-mangan. See Manganese.
 Guillotine, Post-nasal. See Naso-pharynx; Adenoids.
 Guinea Worm. See Parasites; Filaria Medinensis.
 Gum-boil. See Jaws; Alveolar Abscess.
 Gumma, Intrapelvic. See Syphilis; Period of Sequelæ.
 Gumma of Ciliary Body. See Iris, Ciliary Body, and Choroid; Tumors.

- Gumma of Epididymis. See Syphilis; Period of Sequelæ.
- Gumma of Iris. See Iris; Tumors.
- Gumma of Pancreas. See Pancreas; Tumors.
- Gumma of Pharynx. See Tonsils; Tumors.
- Gumma of Spinal Cord. See Spine, Diseases of; Tumors.
- Gumma, Syphilitic. See Erythema Scrofulosum.
- Gumous Patches of Stomach. See Stomach; General Infection.
- Gummy Infiltration. See Syphilis; Period of Sequelæ.
- Gummy Tumor in Brain. See Syphilis; Period of Sequelæ.
- Gummy Tumor of Iris. See Syphilis; General Infection.
- Gums, Bleeding of. See Mercury; Untoward effects—Myxœdema.
- Gums, Bloody. See Yellow Fever.
- Gums, Blue Line on. See Lead; Chronic Poisoning.
- Gums, Dark Line on. See Mercury; Untoward Effects.
- Gums, Hemorrhage from. See Mercury; Untoward Effects—Myxœdema.
- Gums, Purplish Blue. See Scorbutus, Infantile.
- Gums, Sarcoma of. See Jaws; Epulis.
- Gums, Sensitive. See Mercury; Untoward Effects.
- Gums, Slate-colored Lines along. See Silver; Poisoning; Chronic.
- Gums, Spongy. See Mercury; Untoward Effects—Scorbutus—Scorbutus, Infantile.
- Gums, Ulceration of. See Scorbutus.
- Gunjah. See Cannabis Indica.
- Gunning's Test for Acetone. See Acetonuria.
- Gunshot Wounds of Abdomen. See Abdomen; Penetrating Wounds—Abdomen; Wounds due to Military Arms.
- Gunshot Wounds of Head. See Wounds of Head; Diseases Involving Skull.
- Gunshot Wounds of Spine. See Spine, Diseases of; Wounds.
- Gurjun-oil. See Leprosy.
- Gynæcological Disorders. See Sodium.
- Gynocardic Acid. See Chaulmugra-oil.
- Gyrosperm. See Spasms in Children; Automatic Movements.
- Habit Spasm. See Chorea; Anomalous Varieties.
- Hacking Cough. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
- Hæmalbumin. See Iron.
- Hæmatemesis. See Abdomen; Contusion—Abdomen; Penetrating Wounds; Stomach—Adenitis; Chronic—Cholelithiasis—Creasote; Hemorrhages—Diphtheria—Gastric Hemorrhage (Index)—Hamamelis; Hemorrhage—Intestines; Duodenum; Ulceration—Iron; Hemorrhage—Lead; Gastro-Intestinal Disorders—Malarial Fevers; Pernicious—Naso-pharynx; Adenoids—Esophagus; Esophagitis—Potassium; Poisoning—Specific Infectious Fevers; Relapsing—Stomach, Diseases of; Carcinoma—Stomach, Hemorrhage from (Index)—Turpentine—Wounds and Injuries of Thorax; Hemorrhage—Vomiting, Bloody (Index).
- Hæmatocele. See Ichthyol; Gynæcological Disorders—Penis and Testicles; Hydrocele.
- Hæmatemesis. See Hemorrhage, Gastric (Index)—Stomach, Diseases of; Carcinoma—Turpentine—Vomiting, Bloody (Index).
- Hæmatocele into Broad Ligament. See Uterine Adnexa; Tumors of Ovaries.
- Hæmatocele into Douglas's Pouch. See Uterine Adnexa; Tumors of Ovaries.
- Hæmatochyluria. See Parasites; Filaria.
- Hæmatogenous Jaundice. See Jaundice.
- Hæmatoma. See External Ear; Injuries—Leukæmia—Wounds and Injuries of Thorax; Mural Injuries.
- Hæmatoma, Arterial. See Aneurism; Popliteal.
- Hæmatoma of Dura Mater. See Meningitis; Internal Pachymeningitis.
- Hæmatoma of Nasal Septum. See Nasal Cavities; Septum.
- Hæmatoma of Vulva. See Vagina; Tumors of Vulva.
- Hæmatoma, Vagino-Vulvar. See Parturition, Abnormal.
- Hæmatoma, Vulvo-Vaginal. See Parturition; Abnormal.
- Hæmatomata of Vagina. See Vagina; Hæmatomata.
- Hæmatometra. See Pregnancy, Disorders of.
- Hæmatomyelia. See Spine, Diseases of; Sprain.
- Hæmatoporphyrin in Urine. See Hæmatoporphyrinuria.
- HÆMATOPORPHYRINURIA (*General Subject*). See Hematuria.
- Hæmatorrhachis. See Spine, Diseases of; Sprain.
- Hæmatosalpinx. See Uterine Adnexa; Inflammation of Tubes—Uterine Adnexa; Tumors of Ovaries.
- Hæmatozoön Falciparum of Welch. See Malarial Fevers; Parasite.
- Hæmatozoön Malarie. See Malarial Fevers; Parasite.
- HÆMATURIA (*General Subject*). See Abdomen; Contusion—Abdomen; Penetrating Wounds; Bladder—Abdomen, Penetrating Wounds; Kidneys—Bright's Disease—Cinnamon—Creasote; Hemorrhages—Ergot; Hemorrhage—Formaldehyde; Vesical Disorders—Juniper; Poisoning—Malarial Fevers; Malarial Hæmaturia—Parasites; Distoma Hæmatobium—Pneumonia, Lobar—Quinine; Malaria—Rheumatism; Acute—Specific Infectious Fevers; Relapsing—Turpentine—Urinary System, Diseases of (Surgical); Injuries of Ureter—Urinary System, Diseases of (Surgical); Tumors of Kidney—Urinary System, Diseases of (Surgical); Ureters—Urinary System, Surgical Diseases of; Tuberculosis of Prostate—Urinary System, Surgical Diseases of; Tumors of Prostate—Urinary System, Surgical Diseases of; Vesical Calculi—Urine, Blood in (Index)—Wounds (Septic) and Gangrene; Pyæmia.
- Hæmaturia, Intermittent. See Urinary System, Diseases of; Pyelitis.
- Hæmaturia, Malarial. See Malarial Fevers—Sodium; Genito-Urinary Disorders.
- Hæmin Test. See Hæmaturia.
- Hæmochromatosis. See Cirrhosis of the Liver; Portal.
- Hæmoferum. See Iron.
- Hæmogallol. See Iron.
- Hæmoglobinæmia. See Hydracetic; Poisoning—Leukæmia.
- HÆMOGLOBINURIA (*General Subject*). See Burns—Iron; Hemorrhage—Leukæmia—Malarial Fevers; Malarial Hæmaturia—Pyrogallol; Poisoning—Quinine; Malaria—Resorcin; Poisoning—Rheumatism; Acute—Urine, Blood in (Index).
- Hæmoglobinuria, Malarial. See Malarial Fevers; Hæmaturia.
- Hæmo-Hepatogenous Jaundice. See Jaundice; Toxicæmic.
- Hæmol. See Iron.
- Hæmolytic. See Anæmia, Pernicious.
- Hæmomedastinum. See Wounds and Injuries of Thorax; Hemorrhage.
- Hæmopericardium. See Pericardium—Wounds and Injuries of Thorax; Hemorrhage—Wounds and Injuries of Thorax; Wounds of Heart.
- HÆMOPHILIA (*General Subject*). See Animal Extracts; Thyroid; Uterine Disorders—Creasote; Hemorrhages—Epistaxis—Hæmorrhagic Diathesis (Index)—Pulmonary Circulation; Hemorrhage—Scorbutus, Infantile—Syphilis; Congenital.
- Hæmopneumothorax. See Wounds and Injuries of Thorax; Pneumothorax.
- Hæmoptysis. See Cinnamon—Creasote; Hemorrhages—Epistaxis—Ergot; Hemorrhage—Hydrastis; Hemorrhage—Iodine; Iodoform; Surgical Tuberculosis—Ipecac—Hemorrhage—Malarial Fevers; Pernicious—Myxœdema—Nitroglycerin; Miscellaneous Disorders—Parasites; Distoma Pulmonale—Pneumonokonioid—Potassium; Febrile—Pulmonary Circulation; Hemorrhage—Pulmonary Emphysema; Vesicular—Pulmonary Hemorrhage (Index)—Sodium; Laryngological Disorders—Tuberculosis of Lungs—Valvular Diseases of Heart; Mitral Stenosis—Vascular System; Vascular Obstruction; Fat-embolism—Wounds (Septic) and Gangrene; Pyæmia—Wounds and Injuries of Thorax; Hemorrhage—Wounds and Injuries of Thorax; Rupture of Lung.
- Hæmoptysis, Arthritic. See Pulmonary Circulation; Hemorrhage.
- Hæmorrhage. See Anæmia, Pernicious—Aneurism—Antipyrine; Local Use—Asaprol—Bromide of Ethyl; Untoward Effects—Creasote—Diphtheria—Dislocations—Ergot—Erythroxylon Coca and

- Cocaine; Topical Administration — Europhen; Wounds—Fractures—Hamamelis—Jaundice; Obstructive—Jaundice; Toxæmia—Leukæmia—Malarial Fevers; Hæmaturia — Malarial Fevers; Pernicious — Naso-pharynx; Adenoids—Œsophagus; Foreign Bodies—Œsophagus; Tumors—Salicylic Acid; Ferric Salicylate—Scorbutus—Scorbutus, Infantile—Sodium; Laryngological Disorders—Tumors of Larynx and Lungs; Carcinoma of Larynx — Turpentine—Urinary System, Diseases of (Surgical); Renal Calculus — Urinary System, Surgical Diseases of; Wounds of Prostate — Uterus; Inversion — Vagina; Non-cystic Growths — Vagina; Vulva; Varicocele—Vascular System; Arteriosclerosis—Vascular System; Arteritis — Vascular System; Injuries of Arteries; Contusions—Vascular System; Injuries of Blood-vessels — Vascular System; Injuries of Veins — Vascular System; Varix—Vascular System; Vascular Obstruction; Thrombosis — Wounds (Septic); Gangrene—Wounds and Injuries of Thorax; Injuries to Mediastinum — Wounds and Injuries of Thorax; Primary Complications—Wounds and Injuries of Thorax; Wounds of Heart—Wounds and Injuries of Thorax; Wounds of Lung.
- Hæmorrhage, Abdominal. See Potassium; Purgatives.
- Hæmorrhage, Broncho-Pulmonary. See Pulmonary Circulation.
- Hæmorrhage, Cerebral. See Cerebral Hæmorrhage (Index).
- Hæmorrhage, Cutaneous. See Petroleum Poisoning.
- Hæmorrhage, Extradural. See Wounds of Head; Diseases Involving Skull.
- Hæmorrhage from Bladder. See Bladder, Hæmorrhage from (Index).
- Hæmorrhage from Bowels. See Bowel, Hæmorrhage from (Index).
- Hæmorrhage from Breast. See Tumors of Breast; Encephaloid—Tumors of Breast; Scirrhus Carcinoma.
- Hæmorrhage from Ear. See Ear, Hæmorrhage from (Index).
- Hæmorrhage from Gums. See Gums, Hæmorrhage from (Index).
- Hæmorrhage from Hepatic Obstruction. See Potassium; Purgatives.
- Hæmorrhage from Kidneys. See Renal Hæmorrhage (Index).
- Hæmorrhage from Leech-bites. See Silver; Surgical Disorders.
- Hæmorrhage from Liver. See Liver, Hæmorrhage from (Index).
- Hæmorrhage from Placenta Prævia. See Sodium; Gynecological Disorders.
- Hæmorrhage from Spleen. See Spleen, Hæmorrhage from (Index).
- Hæmorrhage from Stomach. See Hæmatemesis (Index).
- Hæmorrhage from Urinary Passages. See Piperazine.
- Hæmorrhage from Vulva. See Vagina; Vulva; Vulvitis.
- Hæmorrhage, Gastric. See Gastric Hæmorrhage (Index)—Hæmatemesis (Index).
- Hæmorrhage in Eye Operations. See Animal Extracts; Supra-renal.
- Hæmorrhage in Infants. See Syphilis; Congenital.
- Hæmorrhage, Internal. See Spleen; Hypertrophy—Uterine Adnexa; Tumors of Ovaries.
- Hæmorrhage, Intersplenic. See Meningitis; Spinal.
- Hæmorrhage, Intestinal. See Intestinal Hæmorrhage (Index).
- Hæmorrhage into Abdominal Cavity. See Uterine Adnexa; Tumors of Ovaries.
- Hæmorrhage into Cornea. See Cornea; Opacities of.
- Hæmorrhage into Joints. See Hæmophilia.
- Hæmorrhage into Orbits. See Abdomen, Contusion.
- Hæmorrhage into Pons Varolii. See Alcoholism; Acute.
- Hæmorrhage into Spinal Cord. See Spinal Cord; Hæmorrhage into (Index).
- Hæmorrhage into Supra-renal Capsules. See Supra-renal Capsules; Diseases of.
- Hæmorrhage, Intracranial. See Intracranial Hæmorrhage (Index).
- Hæmorrhage, Intra-peritoneal. See Intra-peritoneal Hæmorrhage (Index).
- Hæmorrhage, Laryngeal. See Laryngitis; Acute.
- Hæmorrhage, Mucous. See Turpentine.
- Hæmorrhage, Nasal. See Epistaxis (Index).
- Hæmorrhage, Œsophageal. See Cirrhosis of the Liver; Portal.
- Hæmorrhage of Brain. See Vascular Diseases of Brain; Embolism.
- Hæmorrhage of Rectum. See Rectum, Hæmorrhage of (Index).
- Hæmorrhage of Thyroid Gland. See Goitre.
- Hæmorrhage, Orbital. See Typhoid Fever.
- Hæmorrhage, Pancreatic. See Pancreas.
- Hæmorrhage, Pleural. See Pleura; Hæmothorax.
- Hæmorrhage, Post-abortion. See Iron; Hæmorrhage.
- Hæmorrhage, Post-partum. See Post-partum Hæmorrhage (Index).
- Hæmorrhage, Pulmonary. See Pulmonary Hæmorrhage (Index).
- Hæmorrhage, Rectal. See Rectum, Hæmorrhage of (Index).
- Hæmorrhage, Renal. See Renal Hæmorrhage (Index).
- Hæmorrhage, Retinal. See Retinal Hæmorrhage (Index).
- Hæmorrhage, Secondary. See Vascular System; Injuries of Arteries.
- Hæmorrhage, Spinal. See Spinal Hæmorrhage (Index).
- Hæmorrhage, Subconjunctival. See Conjunctival Hæmorrhage (Index).
- Hæmorrhage, Subdural. See Subdural Hæmorrhage (Index).
- Hæmorrhage, Subhyaloid. See Optic Nerve and Retina; Retinitis.
- Hæmorrhage, Subperitoneal. See Abdomen; Contusion.
- Hæmorrhage, Traumatic Intracranial. See Wounds of Head; Diseases Involving Skull.
- Hæmorrhage under Scalp. See Scalp, Hæmorrhage under (Index).
- Hæmorrhage, Urethral. See Urethra; Hæmorrhage (Index)—Urinary System, Surgical Diseases of; Polyps.
- Hæmorrhage, Uterine. See Abortion — Uterine Hæmorrhage (Index).
- Hæmorrhagic Bubo. See Plague.
- Hæmorrhagic Chancre. See Syphilis; Initial Lesion.
- Hæmorrhagic Diathesis. See Hæmophilia (Index)—Iron; Hæmorrhage — Nux Vomica; Blood Disorders—Sodium; Laryngological Disorders.
- Hæmorrhagic Erosions of Stomach. See Syphilis; General Infection.
- Hæmorrhagic Eruption. See Measles; Severe Type — Typhus Fever (Index)—Varicella.
- Hæmorrhagic Infarction. See Infarction, Hæmorrhagic (Index).
- Hæmorrhagic Internal Pachymeningitis. See Meningitis.
- Hæmorrhagic Malarial Fever. See Malarial Fever, Hæmorrhagic (Index).
- Hæmorrhagic Pyelitis. See Urinary System, Diseases of; Pyelitis.
- Hæmorrhagic Rash. See Measles; Severe Type.
- Hæmorrhagic Retinitis. See Optic Nerve and Retina; Retinitis.
- Hæmorrhagic Small-pox. See Valvular Diseases of Heart; Acute Endocarditis; Septicæmia.
- Hæmorrhagic Spots. See Scorbutus—Variola.
- HÆMORRHOIDS (*General Subject*). See Aloes — Aluminium; Borotannate—Chronic Acid; Morbid Growths — Cirrhosis of the Liver; Portal—Constipation—Dysentery—Hamamelis; Hæmorrhage — Hydrastis; Hæmorrhage—Jalap—Leukæmia—Linum—Liver; Abscess—Liver; Passive Congestion—Pix Liquida; Cutaneous Disorders—Potassium; Chlorate—Potassium; Purgatives—Pregnancy, Disorders of — Rectum and Anus; Irritable Ulcer—Rectum and Anus; Prolapse—Rhubarb—Sulphur; Gastro-Intestinal Diseases—Syphilis; Infectious Secretions—Tumors; Angiomata—Tumors of Rectum and Anus; Malignant Growths—Urinary System, Surgical Diseases of; Hypertrophy of Prostate.
- Hæmorrhoids, Bleeding. See Ergot; Hæmorrhage—Iron; Local Uses—Nitric Acid; Local Uses—Podophyllum.
- Hæmorrhoids, Post-operative Treatment. See Orthoform.
- Hæmostatic. See Alcohol—Alumnol—Animal Extracts; Thyroid; Uterine Disorders—Antipyrine

- Hæmostatic.**
 —Asaprol — Atropine — Cinnamon — Creasote—
 Ergot—Erythroxylon Coca and Cocaine—Hama-
 melis—Hydrastis—Ipecac—Kino—Lead—Nitro-
 glycerin—Oxygen—Potassium—Resorcin—Salol
 —Turpentine.
- Hæmothorax.** See Aneurism—Pleura—Wounds and
 Injuries of Thorax; Fractures—Wounds and In-
 juries of Thorax; Hæmorrhage—Wounds and
 Injuries of Thorax; Injuries of Pleura—Wounds
 and Injuries of Thorax; Pneumothorax.
- Haffkine's Anticholera Inoculations.** See Cholera
 Asiatica.
- Haffkine's Prophylactic Fluid.** See Plague.
- Hair, Club-Shaped.** See Alopecia Areata.
- Hair, Falling of.** See Alopecia.
- Hair, Greenish Coloration of.** See Copper; Physi-
 ological Action.
- Hair-dye.** See Lead; Chronic Poisoning.
- Hair-eye Eruption.** See Erythema Medicamen-
 tosum.
- Hair-tonic.** See Quinine; Cutaneous Disorders.
- Hallucinations.** See Alcoholism; Delirium Tremens
 —Cocainomania—Coffee; Poisoning—Erysipelas
 —Insanity—Iodine; Iodoform; Untoward Effects
 —Lead; Chronic Poisoning—Malarial Fevers;
 Pernicious—Myxœdema—Piperazin; Poisoning—
 Rabies—Spasms in Children; Hysteria.
- Hallucinations, Visual.** See Neuralgia; Migraine.
- Hallux Valgus.** See Orthopædic Surgery.
- Halsted's Mattress Suture.** See Stomach, Surgery
 of; Intestines; Enterorhaphy.
- Halsted's Operation for Cancer of Breast.** See Tu-
 mors of Breast.
- Halsted's Operation for Hernia.** See Hernia; In-
 guinal.
- Ham Poisoning.** See Toxic Foods; Meat Poisoning.
- HAMAMELIS (General Subject).**
- Hammer-toe.** See Orthopædic Surgery.
- Hammock, Davies's.** See Spine, Diseases of; Tuber-
 culosis.
- Hand, Club.** See Orthopædic Surgery.
- Hands, Analgesia of.** See Spinal Cord; Syringo-
 myelia.
- Hands, Atrophy of Muscles of.** See Spinal Cord;
 Syringomyelia.
- Hands, Chapped.** See Benzoin—Glycerin.
- Hands, Formication in.** See Valerian; Physiolog-
 ical Action.
- Hands, Hyperidrosis of.** See Salicylic Acid.
- Hands, Paræsthesia of.** See Spinal Cord; Syringo-
 myelia.
- Hanot's Cirrhosis.** See Cirrhosis of the Liver; Bil-
 iary.
- Hansen's Bacillus Lepræ.** See Leprosy.
- Haphalgæsia.** See Locomotor Ataxia.
- Harelip.** See Plastic Surgery.
- Harlan's Operation.** See Palpebræ; Symblepharon.
- Hasheesh.** See Cannabis Indica.
- "Hasty Micturition.** See Spinal Cord; Primary
 Lateral Sclerosis.
- Hay Fever.** See Acetic Acid; Nose and Throat—
 Cannabis Indica—Cube; Catarrhal Disorders—
 Grindelia—Menthol; Naso-laryngeal Disorders—
 Orthoform—Ozone—Phenic (Carbolic) Acid—Qui-
 nine; Antiseptic—Resorcin—Respiratory Organs,
 Neuroses of; Hyperæsthetic Rhinitis.
- Head, Cranioclast to.** See Parturition, Abnormal.
- Head, Gunshot Wounds of.** See Wounds of Head;
 Diseases Involving Skull.
- HEAD, INJURIES OF (General Subject).** See Cere-
 bral Abscess—Encephalitis—Fractures; Skull—
 Glycosuria—Insanity; Cranial Traumatism—
 Wounds and Injuries of Head.
- Head, Oscillatory Movements of.** See Hysteria;
 Ataxia.
- Head, Puncture of.** See Hydrocephalus; Chronic.
- Head, Retraction of.** See Meningitis; Acute Lepto-
 meningitis—Meningitis; Acute Spinal Leptomen-
 ingitis—Pneumonia, Catarrhal.
- Head, Rhythmical Movements of.** See Hysteria;
 Ataxia.
- Head Tetanus.** See Tetanus.
- Head, Wounds and Injuries of.** See Wounds and
 Injuries of Head.
- Headache.** See Acetanilid; Neuralgia—Acromegaly
 —Alcohol; Externally—Anhalonium Lewinii—
 Antipyrine; Nervous Disorders—Astigmatism;
 Regular—Blepharitis; Ciliaris—Bright's Dis-
 ease; Acute—Bright's Disease; Chronic—Brom-
 mides—Cannabis Indica; Cephalalgia—Cannabis
 Indica; Physiological Action—Cerebral Abscess
 —Cerebral Hæmorrhage—Cimicifuga; Poisoning
 —Coffee; Caffeine; Cephalalgia—Constipation—
 Cystitis—Eclampsia—Encephalitis—Eucalyptus
 —Exalgin—Gout—Head, Injuries of—Hemicrania
 (Index)—Hydrocephalus; Acute—Hyperopia—
 Hypertrophy of the Heart—Hypnotism; Func-
 tional Disorders—Hysteria; Hyperæsthesia—In-
 fluenza—Insanity—Insolation—Iodine; Iodoform;
 Untoward Effects—Jaundice; Acute Infectious—
 Jaundice; Obstructive—Lead; Chronic Poisoning
 —Leukæmia—Liver; Active Congestion—Liver;
 Acute Yellow Atrophy—Malarial Fevers—Man-
 ganese; Menstrual Disorders—Meningitis; Cere-
 bral—Menopause—Menthol; Painful Disorders—
 Methylene-blue—Middle Ear; Chronic Mastoiditis
 —Migraine (Index)—Mustard—Myocarditis;
 Chronic—Myopia—Naso-pharynx; Adenoids—
 Naso-pharynx; Chronic Naso-pharyngitis—Naso-
 pharynx; Tumors—Neuralgia; Migraine—Neu-
 rathenia—Nitrites; Neuralgia—Nitrites; Poi-
 soning—Nitrobenzene—Nitroglycerin; Nervous
 Disorders—Nitroglycerin; Physiological Action—
 Orbit; Orbital Cellulitis—Oxygen; Oxygen-water
 —Parotitis, Infectious—Pericardium; Pericar-
 ditis—Petroleum; Poisoning—Phenacetin—Phen-
 acetin; Thymacetin—Phosphorus; Poisoning—
 Pix Liquida; Poisoning—Plague—Pneumonia,
 Catarrhal—Pneumonia, Lobar—Potassium; Cy-
 anide—Pseudoleukæmia—Quassia; Poisoning—
 Quinine; Physiological Action—Salicylic Acid;
 Poisoning—Spasms in Children; Tetany—Spinal
 Cord; Poliomyelitis—Stomach, Diseases of;
 Acute Gastritis—Stomach, Diseases of; Chronic
 Gastritis—Stomach, Diseases of; Dilatation—
 Sulphonal; Poisoning—Syphilis; General Infection
 —Thymol; Thymacetin—Tonsils; Tonsillitis
 —Toxic Foods; Grain Poisoning—Tumors of the
 Brain—Tumors of Brain; Tumors of Corpora
 Quadrigemina—Typhoid Fever—Uremia—Val-
 vular Diseases of Heart; Aortic Regurgitation—
 Valvular Diseases of Heart; Tricuspid Regurgi-
 tation—Vascular Diseases of Brain; Embolism—
 Vascular Diseases of Brain; Thrombosis—Vas-
 cular System; Arteriosclerosis—Wounds of
 Head; Wounds of Brain—Wounds (Septic) and
 Gangrene; Septicæmia—Yellow Fever.
- Headache, Billious.** See Neuralgia; Migraine.
- Headache, Frontal.** See Specific Infectious Fevers;
 Dengue.
- Headache, Nervous.** See Zinc; Nervous Disorders.
- Headache, Neuralgic.** See Neuralgia; Migraine.
- Headache, Occipital.** See Spine, Diseases of; Tu-
 berculous.
- Headache, Sick.** See Guarana—Ipecac—Magnesia;
 Antacid—Mentha—Neuralgia and Migraine—Nux
 Vomica; Gastro-Intestinal Disorders—Podophyl-
 lum—Sodium; Gastro-Intestinal Disorders.
- Head-banging.** See Spasms in Children; Automatic
 Movements.
- Head-nodding.** See Spasms in Children; Automatic
 Movements.
- Head-shaking.** See Spasms in Children; Automatic
 Movements.
- Heart.** See Cardiac (Index).
- Heart, Dilatation of.** See Digitalis; Diseases of
 Heart—Dilatation of Heart—Fatty Heart—Hyp-
 ertrophy of Heart—Myocarditis—Pericardium;
 Pericarditis—Valvular Diseases of Heart; Mitral
 Stenosis.
- Heart, Diseases of.** See Abortion—Adonis—Angina
 Pectoris—Apocynum Cannabinum—Asthma—
 Coffee; Caffeine—Digitalis—Erythroxylon Coca
 and Cocaine—Ether; Contra-indications—Insan-
 ity—Oxygen; Inhalation—Salicylic Acid; Theo-
 bromine and Sodium Salicylate—Strontium;
 Gastro-Intestinal Disorders.
- Heart, Displaced.** See Dilatation of the Heart—Hyp-
 ertrophy of the Heart—Aneurism—Pleura, Dis-
 eases of—Wounds and Injuries of Thorax; Pneu-
 mothorax.
- Heart, Distended Right.** See Jalap.
- Heart, Enlarged.** See Valvular Diseases of Heart;
 Mitral Regurgitation.
- Heart, Fatty.** See Fatty Heart (Index).
- Heart, Fatty Degeneration of.** See Fatty Degenera-
 tion of Heart (Index).
- Heart, Fatty Infiltration of.** See Fatty Heart and
 Obesity.
- Heart, Foreign Bodies in.** See Wounds and Injuries
 of Thorax; Foreign Bodies in Heart.

- Heart, Hypertrophy of. See Bright's Disease; Chronic—Cardiac Hypertrophy (Index)—Dilatation of the Heart—Hypertrophy of Heart—Pericardium; Pericarditis.
- Heart in Alcoholism. See Alcoholism.
- Heart, Injuries of. See Mediastinum; Mediastino-Cardiac Injuries.
- Heart, Irregular. See Vasculo-Cardiac Neuroses.
- Heart, Palpitation of. See Anæmia—Anæmia, Pernicious—Animal Extracts; Thyroid; Untoward Effects—Cannabis Indica; Cardiac Diseases—Dilatation of the Heart—Exophthalmic Goitre—Fatty Heart—Gout—Hypertrophy of Heart—Iron; Cardiac Diseases—Locomotor Ataxia—Menopause—Neurasthenia—Phenacetin; Poisoning—Valvular Diseases of Heart; Aortic Regurgitation—Valvular Diseases of Heart; Mitral Regurgitation—Valvular Diseases of Heart; Tricuspid Stenosis—Vascular System; Arteriosclerosis—Vasculo-Cardiac Neuroses—Vasculo-Cardiac Neuroses; Rapid Heart—Veratrum Viride; Poisoning.
- Heart, Paralysis of. See Beriberi—Bromides; Untoward Effects—Cardiac Paralysis (Index)—Chloroform; Physiological Effects—Curara; Physiological Action—Diphtheria.
- Heart, Puncture of. See Wounds and Injuries of Thorax.
- Heart, Rapid. See Vasculo-Cardiac Neuroses; Rapid Heart.
- Heart, Rupture of. See Fatty Heart—Myocarditis—Wounds and Injuries of Thorax; Fractures—Wounds and Injuries of Thorax; Rupture of Heart.
- Heart, Sarcomata of. See Mediastinum; Tumors.
- Heart, Slow. See Vasculo-Cardiac Neuroses; Slow Heart.
- Heart, Suture of. See Wounds and Injuries of Thorax.
- Heart, Valvular Diseases of. See Valvular Diseases of Heart (Index).
- Heart, Wounds of. See Wounds and Injuries of Thorax; Wounds of Heart.
- Heart-burn. See Ammonia; Gastric Hyperacidity—Belladonna; Gastro-Intestinal Disorders—Hydrochloric Acid; Gastric Disorders—Nux Vomica; Gastro-Intestinal Disorders—Potassium; Antacids—Pyrosis (Index)—Stomach, Diseases of; Chronic Gastritis—Stomach, Diseases of; Functional; Hyperchlorhydria—Stomach, Diseases of; Gastric Ulcer.
- Heart-failure. See Camphor; Diseases of Heart—Diphtheria—Ether; Therapeutics—Mercury; Metallic—Nerves, Peripheral; Multiple Neuritis—Typhoid Fever.
- Heart-murmurs. See Murmurs (Index).
- Heart-muscle, Inflammation of. See Myocarditis (Index).
- Heart-stimulant. See Alcohol—Pyridin—Stimulant, Cardiac (Index).
- Heat, Flashes of. See Thyroid Gland; Thyroid Fever.
- Heat-apoplexy. See Insolation.
- Heat-exhaustion. See Insolation.
- Heat-prostration. See Insolation.
- Heat-stroke. See Insolation.
- Hebephrenia. See Insanity; Pubescent.
- Heberden's Finger. See Gout.
- Heberden's Ink. See Cinchona.
- Heberden's Knots. See Rheumatism; Chronic Articular.
- Hebetude. See Toxic Foods; Grain Poisoning.
- Hebetude, Mental. See Mental Hebetude (Index).
- Hectic Fever. See Iron; Pulmonary Disorders—Pleurisy; Acute—Quinine; Antipyretic—Surgical Diseases; Secondary Wound Fever.
- Hectic Fever of Phthisis. See Quinine; Antipyretic Action.
- Hegar's Operation. See Vagina; Prolapse.
- Heineke-Mikulicz Operation. See Stomach, Surgery of; Pyloroplasty.
- Helianthus. See Malarial Fevers.
- Hellebore, American. See Veratrum Viride.
- Hellebore, Swamp. See Veratrum Viride.
- Hellebore. See Alkaloids.
- Heller's Test. See Albuminuria—Hæmaturia—Indicanuria.
- Hemialbumose. See Albuminuria.
- Hemianæsthesia. See Tumors of Brain; Tumors of Crus—Tumors of Brain; Tumors of Great Ganglia—Tumors of Brain; Tumors of Pons.
- Hemianopsia. See Neuralgia; Migraine—Tumors of Brain—Vascular Diseases of Brain; Post-cerebral Artery—Wounds of Head; Wounds of Brain.
- Hemianopsia, Bilateral Homonymous. See Hysteria; Special Sense-organs.
- Hemianopsia, Lateral Homonymous. See Tumors of Brain; Tumors of Crus—Tumors of Brain; Tumors of Great Ganglia—Tumors of Brain; Tumors of Occipital Lobe—Tumors of Brain; Tumors of Parietal Lobe.
- Hemichorea. See Cerebral Hæmorrhage—Chorea.
- Hemicrania. See Antipyrine; Nervous Disorders—Methylene-blue—Neuralgia; Migraine—Quinine; Tonic.
- Hemiplegic Pupillary Reflex of Wernicke. See Tumors of Brain; Tumors of Crus.
- Hemiparesis. See Tumors of Brain; Tumors of Corpus Callosum.
- Hemiplegia. See Alcoholic Neuritis—Aphasia; Motor—Bright's Disease; Non-exudative Chronic—Bromides; Untoward Effects—Cerebral Hæmorrhage; Paralysis—Diabetes Mellitus—Diphtheria—Encephalitis, Acute Non-suppurative—Encephalitis; Prenatal—Erythema Symptomaticum—Exophthalmic Goitre—Hydrocephalus; Acute—Hysteria—Hysteria; Motor Symptoms—Lead; Chronic Poisoning—Meningitis; Acute Leptomeningitis—Sclerosis of Brain—Scorbutus—Spinal Cord; Poliomyelitis—Strychnine; Nervous Disorders—Syphilis, Period of Sequelæ—Tumors of Brain—Tumors of Brain; Tumors of Crus—Tumors of Brain; Tumors of Pons—Typhoid Fever—Vascular Diseases of Brain: Basilar Artery—Vascular Diseases of Brain; Embolism—Vascular Diseases of Brain; Sylvian Artery—Wounds of Head; Wounds of Brain.
- Hemiplegia Alternans Inferior. See Vascular Diseases of Brain; Basilar Artery.
- Hemiplegia Alternans Superior. See Vascular Diseases of Brain; Basilar Artery.
- Hemiplegia, Cerebral. See Cerebral Hemiplegia (Index).
- Hemiplegia, Facial. See Diabetes Mellitus.
- Hemiplegia, Infantile. See Hypnotism.
- Hemiplegia, Spastic. See Encephalitis; Prenatal.
- Hemiplegia, Transient. See Vascular System; Arteriosclerosis.
- Hemp. See Cannabis Indica.
- Hemp, Canadian. See Apocynum Cannabinum.
- Hemp, Indian. See Anhalonium Lewinii.
- Henbane. See Hyoscyamus.
- Hepatalgia. See Strychnine; Nervous Disorders.
- Hepatic. See Liver (Index).
- Hepatic Abscess. See Abscess, Hepatic (Index).
- Hepatic Catarrh. See Salol.
- Hepatic Cirrhosis. See Liver, Cirrhosis of (Index)—Peritoneum; Tuberculous Peritonitis—Phosphorus, Phosphates—Specific Infectious Fever; Terminal Infections.
- Hepatic Colic. See Abortion—Amyl-valerianate—Atropine—Cholelithiasis—Locomotor Ataxia—Nitroglycerin—Obstruction, Intestinal—Olive-oil.
- Hepatic Disorders. See Mercury; Chlorides.
- Hepatic Disturbances, Functional. See Podophyllum.
- Hepatic Function, Disordered. See Sulphur; Gastro-Intestinal Diseases.
- Hepatic Obstruction, Hæmorrhage from. See Potassium; Purgative.
- Hepatic Torpor. See Phosphorus; Phosphates.
- Hepatic Tumors. See Suprarenal Capsules; Tumors.
- Hepatico-Bronchial Fistula. See Cholelithiasis.
- Hepatitis. See Colchicum; General Maladies—Liver, Diseases of—Malarial Fevers; The Liver—Veratrum Viride.
- Hepatitis, Suppurative. See Liver; Abscess.
- Hepatisation. See Pneumonia, Lobar.
- Hepatogenous Jaundice. See Jaundice; Obstructive.
- Hereditary Ataxia. See Spinal Cord, Diseases of.
- Hereditary Syphilis. See Syphilis; Congenital.
- Hereditary Tuberculosis. See Tuberculosis of Lungs.
- HERNIA (General Subject). See Digitalis—Obstruction, Intestinal—Penis and Testicles; Hydrocele—Penis and Testicles; Phimosis—Penis and Testicles; Undescended Testicle—Peritoneum; Tuberculous Peritonitis—Status Lymphaticus;

- Hernia.
 Lymphangiectasis—Uterine Adnexa; Tumors of Ovaries.
 Hernia, Bassini's Operation for. See Bassini's Operation (Index).
 Hernia Cerebri. See Encephalocele — Wounds of Head; Fungus.
 Hernia, Diaphragmatic. See Diaphragmatic Hernia (Index).
 Hernia, Femoral. See Hernia.
 Hernia, Intestinal. See Vagina; Tumors of Vulva.
 Hernia, Naso-ethmoidal. See Encephalocele.
 Hernia, Naso-frontal. See Encephalocele.
 Hernia, Naso-orbital. See Encephalocele.
 Hernia, Occipital. See Encephalocele.
 Hernia of Bladder. See Vagina; Herniæ.
 Hernia of Liver. See Liver; Displacements.
 Hernia of Lung. See Lung, Hernia of (Index).
 Hernia of Muscle. See Muscles; Surgical Diseases.
 Hernia of Rectum. See Vagina; Herniæ.
 Hernia, Ovarian. See Uterine Adnexa; Displacements of Ovary.
 Hernia, Strangulated. See Hyoscyamus—Penis and Testicles; Torsion of Testicle—Stomach, Surgery of; Intestines; Resection.
 Hernia, Ventral. See Hernia—Uterine Adnexa; Tumors of Ovaries.
 Herniæ within Vagina. See Vagina; Herniæ.
 Hernial Tumor of Vulva. See Vagina; Tumors of Vulva.
 Herniotomy. See Hernia.
 Heroin. See Opium.
 HERPES (*General Subject*). See Anthrabin—Dermatitis Herpetiformis — Iodine; Iodoform; Untoward Effects — Laryngitis; Symptomatic — Locomotor Ataxia; Tropic Symptoms — Mercury; Chlorides; Local Uses — Neuralgia; Fifth Pair — Parasites; Trichina—Pneumonia, Lobar—Resorcin — Respiratory Organs; Nasal Reflex Neuroses—Specific Infectious Fevers; Relapsing — Spinal Cord; Stryngomyelia — Stomach, Diseases of; Acute Gastritis—Zinc; Cutaneous Disorders.
 Herpes Circinatus. See Erythema Multiforme.
 Herpes Facialis. See Herpes—Rheumatism; Acute.
 Herpes Genitalis. See Herpes.
 Herpes Gestationis. See Dermatitis Herpetiformis.
 Herpes Iris. See Erythema Multiforme.
 Herpes Labialis. See Herpes Facialis—Meningitis; Cerebro-Spinal—Toxic Foods; Meat Poisoning.
 Herpes of Clitoris. See Herpes Genitalis.
 Herpes of Cornea. See Herpes.
 Herpes of Face. See Face, Herpes of (Index).
 Herpes of Penis. See Penis, Herpes of (Index).
 Herpes of Prepuce. See Herpes Genitalis.
 Herpes of Tonsils. See Herpes.
 Herpes Progenitalis. See Penis and Testicles; Inflammatory Affections of Penis—Syphilis.
 Herpes Simplex. See Herpes—Herpes Zoster.
 Herpes Tonsurans. See Potassium; Soziodolate.
 HERPES ZOSTER (*General Subject*). See Belladonna; Cutaneous Disorders — Dermatitis Medicamentosa—Eczema—Menthol; Painful Disorders—Neuralgia; Intercostal—Phosphorus; Nervous Disorders—Thiol.
 Herpes Zoster of Mouth. See Mouth.
 Herpes Zoster Ophthalmicus. See Palpebræ; Cutaneous Disorders.
 Herpetic Dermatitis. See Dermatitis Herpetiformis.
 Herpetic Fever. See Herpes Facialis.
 Herpetic Keratitis. See Keratitis.
 Herpetic Lesion, Intra-urethral. See Syphilis.
 Herpeticiform Chancre. See Syphilis; Initial Lesion.
 Herpeticiform Eruption. See Dermatitis Herpetiformis.
 Heterochronic Neoplasms. See Tumors.
 Heterografts. See Skin-grafting.
 Heterophoria. See Strabismus, Latent.
 Heterotopic Neoplasms. See Tumors.
 Heterotropia. See Strabismus.
 Hexahydrate. See Piperazin.
 Heynsius's Test. See Albuminuria.
 Hiccough. See Choral—Cystitis—Ether; Therapeutics—Jaborandi; Chronic Affections—Liver; Abscess—Liver; Acute Perihepatitis—Malarial Fevers; Malarial Hematuria — Malarial Fevers; Pernicious; Bilious Form — Malarial Fevers; Pernicious; Cardialgic Form — Nitroglycerin; Respiratory Disorders—Physostigma; Spasmodic Disorders—Shock—Stomach, Diseases of; Carcinoma—Sulphonal—Typhoid Fever—Yellow Fever.
 Hilton's Line. See Rectum and Anus; Irritable Ulcer.
 Hindenlang's Test. See Albuminuria.
 Hip, Abscess of. See Scorbutus, Infantile.
 Hip, Congenital Dislocation of. See Hip-joint Disease.
 Hip, Dislocations of. See Dislocations.
 Hip, Resection of. See Hip-joint Disease.
 Hip, Sinus of. See Hip-joint Disease.
 Hip, Synovitis of. See Hip-joint Disease.
 Hip, Syphilis of. See Hip-joint Disease.
 Hip-joint, Amputation. See Hip-joint Disease.
 HIP-JOINT DISEASE (*General Subject*). See Nucleins — Osseous System; Bone Tuberculosis — Pancreatin; Surgical Solvent — Spine, Diseases of; Sacro-Iliac Disease—Tendons; Bursitis.
 Hip-joint Excision. See Hip-joint Disease.
 Hip-joint Synovitis. See Hip-joint Disease.
 Hip-joint Tuberculosis. See Hip-joint Disease.
 Hippus. See Hysteria; Special Sense-organs.
 Hip-splint, Thomas. See Hip-joint Disease.
 Hirschberg's Method of Skin-grafting. See Skin-grafting.
 His, Adenoid Tissue of. See Status Lymphaticus; Lymphadenoma.
 Histrionic Spasm. See Physostigma; Spasmodic Disorders.
 Hives. See Urticaria (Index).
 Hoarseness. See Laryngitis—Naso-pharynx; Acute Naso-pharyngitis—Nitric Acid; Internal Uses—Potassium; Febrifuges — Respiratory Organs; Laryngeal Neuroses — Tuberculosis of Larynx — Tumors of Larynx and Lungs; Carcinoma of Larynx—Tumors of Larynx and Lungs; Singer's Nodes.
 Hoek. See Alcohol.
 Hodgen's Traction-splints. See Fractures; Femur.
 Hodgkin's Disease. See Animal Extracts; Bone-marrow—Chlorosis—Pseudoleukæmia (Index)—Specific Infectious Fevers; Terminal Infections.
 Hollow Foot. See Orthopædic Surgery; Pes Cavus.
 Holocaine. See Keratitis.
 HOMATROPINE (*General Subject*).
 Homonymous Diplopia. See Strabismus.
 Homonymous Hemianopsia, Lateral. See Hemianopsia, Lateral Homonymous (Index).
 Homoquinine. See Cinchona.
 Homosalicylic Acid. See Creasote.
 Hop Poultice. See Lupulus.
 Hops. See Lupulus.
 Hordeola. See Blepharitis.
 Hordeolum. See Palpebræ.
 Hordeum Distichum. See Malt.
 Hornet-stings. See Wounds and Stings.
 Horns. See Tumors.
 Horns, Cicatricial. See Tumors; Epithelial.
 Horns, Nail. See Tumors; Epithelial.
 Horns of Scalp. See Wounds of Head; Tumors of Scalp.
 Horns, Sebaceous. See Tumors; Epithelial.
 Horns, Wart. See Tumors; Epithelial.
 Horse-fly's Bite. See Wounds and Stings.
 Horse-mushroom. See Toxic Foods; Edible Mushrooms.
 Horse-serum, Antitubercle. See Tuberculosis of Larynx.
 Hospital Gangrene. See Nitric Acid; Local Uses.
 Hot-Air Baths. See Bright's Disease—Gout—Joints; Arthritis—Rheumatism; Chronic Articular.
 Hot-Air Inhalations. See Tuberculosis of Lungs; Inhalations.
 Hot Baths. See Meningitis; Leptomeningitis.
 Hotz's Operation. See Palpebræ; Entropion.
 Hour-glass Contraction of Stomach. See Stomach, Hour-glass Contraction of (Index).
 House-maid's Knee. See Tendons; Bursitis.
 Huanuco. See Cinchona.
 Humerus, Dislocations of. See Dislocations.
 Humerus, Fractures of. See Fractures.
 Humulus. See Lupulus.
 Hunn's Life-drops. See Cajuput-oil.
 Hunterian Chancre. See Chancre, Hunterian (Index).
 Hunter's Operation. See Aneurism.
 Huntington's Chorea. See Chorea; Anomalous Varieties—Spinal Cord; Hereditary Ataxia.
 Hunyadi Spring-water. See Magnesia; Purgatives.
 Huppert's Test. See Choluria.
 Hutchinson's Mask. See Locomotor Ataxia.

- Hutchinson's Teeth. See Teeth, Hutchinson's (Index).
- Huxham's Tincture. See Cinchona.
- Hydatid. See Tumors; Cysts.
- Hydatid Cysts. See Iodine; Parenchymatous Injections—Parasites; Echinococcus.
- Hydatid Cysts of Kidney. See Urinary System, Diseases of (Surgical); Nephrotomy.
- Hydatid Cysts of Liver. See Liver; Hydatid of.
- Hydatid Cysts of Lung. See Wounds and Injuries of Thorax; Pneumotomy.
- Hydatid Cysts of Peritoneum. See Peritoneum; Tumors.
- Hydatid Cysts of Spleen. See Spleen; Tumors.
- Hydatid of Liver. See Liver, Hydatid of (Index).
- Hydatid or Bladder-worm Disease. See Parasites; Echinococcus Disease.
- Hydatid Thrill. See Liver; Hydatid Cyst.
- Hydatid Tumor, Uterine. See Pregnancy, Disorders of.
- HYDRACETIN (*General Subject*).
 Hydræmic Anæmia. See Infantile Myxœdema.
 Hydragogic Cathartic. See Elaterium—Jalap.
 Hydragogues. See Potassium.
 Hydramnios. See Parturition, Abnormal—Uterine Adnexa; Tumors of Ovaries.
- Hydrastine. See Hydrastis.
- Hydrastine Hydrochlorate. See Alkaloids.
- HYDRATIS (*General Subject*).
 Hydrancephalocoele. See Encephalocoele.
 Hydrancephalocoele, Palatine. See Encephalocoele.
 Hydrobromic Ether. See Bromide of Ethyl.
 Hydroceele. See Hernia; Femoral—Iodine; Parenchymatous Injections—Penis and Testicles—Phenic (Carbolic) Acid; Surgical Disorders—Rheumatism; Acute—Tumors; Cysts.
- Hydroceele of Cord. See Hernia; Strangulated.
- Hydroceele of Fourth Ventricle. See Tumors; Cysts.
- Hydroceele of Round Ligament. See Vagina; Tumors of Vulva.
- Hydrocephaloid Disease. See Meningitis; Leptomeningitis.
- HYDROCEPHALUS (*General Subject*). See Colchicum; General Maladies—Digitalis; Dropsy—Encephalocoele—Insanity; Idiocy—Iodine—Meningitis; Acute Leptomeningitis—Spine, Diseases of; Spina Bifida—Tumors; Cysts—Vascular Diseases of Brain; Thrombosis of Sinuses.
- Hydrocephalus, Chronic. See Tumors of Brain.
- Hydrochinone. See Resorcin; Hydroquinone.
- HYDROCHLORIC ACID (*General Subject*). See Chloroform—Hæmoglobinuria.
- Hydrochole Cyst. See Tumors; Cysts.
- Hydrocotarnine. See Opium.
- HYDROCYANIC ACID (*General Subject*).
 Hydrocyan Cyanide. See Hydrocyanic Acid.
- HYDROGEN DIOXIDE (*General Subject*). See Salicylic Acid; Salacotol.
- Hydrogen Nitrate. See Nitric Acid.
- Hydrogen-gas. See Abdomen; Contusion; Intestines.
- Hydrometra. See Pregnancy, Disorders of—Tumors; Cysts.
- HYDRONEPHROSIS (*General Subject*). See Liver; Hydatid Cyst—Pancreas; Cysts—Parasites; Echinococcus—Peritonæum; Tuberculous Peritonitis—Tumors; Cysts—Urinary System, Diseases of (Surgical); General Surgery—Urinary System, Diseases of (Surgical); Movable Kidney—Urinary System, Diseases of (Surgical); Nephrectomy—Urinary System, Diseases of (Surgical); Renal Calculus—Urinary System, Diseases of (Surgical); Tumors of Kidney—Urinary System, Diseases of (Surgical); Ureters—Uterine Adnexa; Tumors of Ovaries.
- Hydropicardium. See Pericardium, Diseases of.
- Hydrophobia. See Curara—Rabies—Tetanus.
- Hydrophthalmos. See Tension of Eyeball; Glaucoma.
- Hydropneumothorax. See Pleura, Diseases of—Wounds and Injuries of Thorax; Pneumothorax.
- Hydrops Folliculorum. See Uterine Adnexa; Tumors of Ovaries.
- Hydrops of Ureter. See Urinary System, Diseases of (Surgical); Ureterectomy.
- Hydrops Peritonæi. See Peritoneum; Ascites.
- Hydroquinone. See Resorcin.
- Hydrosalpinx. See Peritoneum; Tuberculous Peritonitis—Tumors; Cysts—Uterine Adnexa; Inflammation of Tubes—Uterine Adnexa; Tumors of Ovaries.
- Hydrotherapy. See Measles—Meningitis; Leptomeningitis—Neurasthenia—Pneumonia, Catarrhal—Pneumonia, Lobar—Scarlet Fever—Tuberculosis of Lungs—Typhoid Fever—Typhus Fever.
- Hydrothorax. See Dilatation of the Heart—Jaborandi; Passive Effusions—Myocarditis—Pleura, Diseases of—Pleurisy; Acute—Pulmonary Circulation; Œdema—Vascular System; Vascular Obstruction; Thrombosis.
- Hydroxide of Sodium. See Sodium.
- Hygrine. See Erythroxylon Coca.
- Hyoid Bone, Fractures of. See Fractures.
- Hyoscine. See Hyoscyamus.
- Hyoscine Hydrobromate. See Alkaloids.
- Hyoscyamine. See Alkaloids—Homatropine—Hyoscyamus.
- HYOSCYAMUS (*General Subject*). See Atropine—Toxic Foods; Grain Poisoning.
- Hyoscyamus Eruption. See Dermatitis Medicamentosa.
- Hyperacidity, Gastric. See Gastric Hyperacidity (Index).
- Hyperacidity of Stomach. See Stomach, Hyperacidity of (Index).
- Hyperacousis. See Neurasthenia.
- Hyperæmia, Cutaneous. See Thyroid Gland; Thyroid Fever.
- Hyperæmia of Conjunctiva. See Conjunctiva.
- Hyperæmia of Liver. See Sulphur; Cutaneous Disorders.
- Hyperæmia of Lungs. See Pulmonary Circulation; Congestion.
- Hyperæmia of Nerves. See Nerves, Peripheral.
- Hyperæmia of Ovary. See Uterine Adnexa; Acquired Malformations of Ovaries.
- Hyperæmia of Spleen. See Spleen, Diseases of.
- Hyperæmia, Passive. See Vascular System; Vascular Obstruction; Thrombosis.
- Hyperæsthesia. See Hysteria; Sensory Symptoms—Influenza—Locomotor Ataxia—Nerves, Wounds and Injuries of—Rabies—Spinal Cord; Myelitis—Spine, Diseases of; Tumors—Typhoid Fever.
- Hyperæsthesia, Gastric. See Stomach, Diseases of; Functional Diseases.
- Hyperæsthesia, Muscular. See Meningitis; Spinal.
- Hyperæsthesia of Spine. See Meningitis; Spinal.
- Hyperæsthesia of Vagina. See Vagina; Vaginismus.
- Hyperæsthesia of Vulva. See Vulva, Hyperæsthesia of (Index).
- Hyperæsthetic Rhinitis. See Respiratory Organs, Neuroses of.
- Hyperalgæsia. See Hysteria; Sensory Symptoms—Spinal Cord; Landry's Paralysis—Spinal Cord; Myelitis.
- Hyperchlorhydria. See Cannabis Indica; Digestive Disorders—Stomach, Diseases of; Dilatation—Stomach, Diseases of; Functional Diseases—Stomach, Diseases of; Gastric Ulcer.
- Hyperemesis Gravidarum. See Pregnancy, Disorders of.
- Hyperidrosis. See Aristol—Belladonna; Cutaneous Disorders—Chloral; Skin Diseases—Chronic Acid; Antiseptic—Jaborandi; Cutaneous Disorders—Phosphorus; Cutaneous Disorders—Sulphur; Cutaneous Disorders.
- Hyperidrosis of Axillæ. See Sodium; Cutaneous Disorders.
- Hyperidrosis of Feet. See Feet, Hyperidrosis of (Index)—Feet, Perspiration of (Index).
- Hyperidrosis of Hands. See Salicivæ Acid.
- Hypermetropia. See Atropine; Disorders of Eye—Hyperopia.
- Hypermotility Gastric. See Stomach, Diseases of; Functional Diseases.
- HYPEROPIA (*General Subject*).
- Hyperoræxia. See Stomach, Diseases of; Functional Diseases.
- Hyperosmia. See Respiratory Organs; Nasal Neuroses.
- Hyperostosis. See Osseous System; Ostitis.
- Hyperphoria. See Strabismus; Latent.
- Hyperplasia of Lymphatic Glands. See Status Lymphaticus.
- Hyperplasia of Lymphoid Bone-marrow. See Status Lymphaticus.
- Hyperplasia of Lymph-tissues. See Status Lymphaticus.
- Hyperplasia of Spleen. See Status Lymphaticus.
- Hyperplasia of Thymus Gland. See Status Lymphaticus.

- Hyperplasia, Ovarian. See Uterus; Myoma.
 Hyperpyrexia. See Insolation.
 Hypertrophia Cordis. See Hypertrophy of the Heart.
 Hypertrophic Cirrhosis of Liver. See Liver, Hypertrophic Cirrhosis of (Index).
 Hypertrophic Emphysema. See Pulmonary Emphysema.
 Hypertrophic Rhinitis. See Rhinitis, Hypertrophic (Index).
 Hypertrophied Left Ventricle. See Left Ventricle, Hypertrophy of (Index).
 Hypertrophied Scars. See Surgical Diseases of the Skin and its Appendages; Cicatricial Scars.
 Hypertrophied Tonsils. See Deaf-mutism.
 Hypertrophy, Cardiac. See Cardiac Hypertrophy (Index).
 Hypertrophy, Cellular. See Vascular System; Phlegmasia Alba Dolens.
 Hypertrophy of Bone. See Acromegaly.
 Hypertrophy of Bones of Skull. See Wounds of Head; Diseases Involving Skull.
 Hypertrophy of Breast. See Tumors of Breast; Hypertrophy.
 HYPERTROPHY OF HEART (*General Subject*). See Heart, Hypertrophy of (Index).
 Hypertrophy of Labia. See Vagina; Tumors of Vulva.
 Hypertrophy of Labia Minora. See Vagina; Vulva; Hypertrophy.
 Hypertrophy of Left Ventricle. See Left Ventricle, Hypertrophy of (Index).
 Hypertrophy of Prostate. See Prostate, Hypertrophy of (Index).
 Hypertrophy of Spleen. See Spleen, Diseases of.
 Hypertrophy of Tonsils. See Tonsils; Hypertrophy.
 Hypertrophy of Vagina. See Vagina.
 Hypertrophy of Vulva. See Vagina; Vulva.
 Hypnial. See Chloral.
 Hypnosis. See Hypnotism—Catalepsy.
 Hypnotic. See Amylene-hydrate—Bromine and its Derivatives—Camphor—Cannabis Indica—Chloral—Hyoscyamus—Lactucarium—Lithium—Opium—Paraldehyde—Salicylic Acid; Antispasmodic—Sulphonal—Thymol; Thymacetin.
 Hypnotic Suggestion. See Constipation.
 HYPNOTISM (*General Subject*). See Alcoholism.
 Hypoachylia. See Stomach, Diseases of; Functional Diseases.
 Hypochondria. See Gold; Mental Disorders—Neurasthenia.
 hypochondriasis. See Intestines; Colitis; Mucous—Iodine; Iodism.
 Hypodermoclysis. See Peritoneum; Acute Peritonitis—Urinary System, Diseases of; Pyelitis.
 Hypoglossal Nerve, Neuritis of. See Nerves, Peripheral; Localized Neuritis.
 Hypoglossal Nerve, Paralysis of. See Head, Injuries of; Cerebral Contusions.
 Hypophosphites. See Phosphorus.
 Hypophosphorous Acid. See Phosphoric Acid.
 Hypopyon. See Keratitis; Suppurative.
 Hypoquerachine. See Quebracho.
 Hypospadia. See Urinary System, Surgical Diseases of; Anomalies of Urethra.
 Hypospadias. See Urinary System, Surgical Diseases of.
 Hypothenar Muscles, Wasting of. See Spinal Cord; Amyotrophic Sclerosis.
 Hypothermia. See Myxœdema—Nerves, Wounds and Injuries of.
 "Hypotonia." See Locomotor Ataxia; Trophic Symptoms.
 Hysterectomy. See Uterus; Carcinoma of Cervix Uteri—Uterus; Carcinoma of Corpus Uteri—Uterus; Deciduoma Malignum—Uterus; Myoma—Uterus; Sarcoma.
 Hysterectomy, Abdominal Supravaginal. See Uterus; Myoma.
 Hysterectomy, Abdominal Total. See Uterus; Myoma.
 Hysterectomy, Vaginal. See Vaginal Hysterectomy (Index).
 HYSTERIA (*General Subject*). See Alcoholism; Acute—Amyl-valerianate—Angina Pectoris—Anhalonium Lewinii—Anorexia Nervosa—Belladonna; Miscellaneous—Bromides; Chorea; Convulsive Maladies—Cajuput-oil; Nervous Diseases—Camphor; Monobromated—Catalepsy—Chloral—Chorea—Copper; Convulsive Diseases—Endometritis—Epilepsy—Erythroxylon Coca and Cocaine—Ether; Therapeutics—Exophthalmic Goitre—Gelsemium; Spasmodic Disorders—Glycosuria—Gold—Herpes Zoster—Hypnotism; Functional Disorders—Insanity; Catatonia—Intestines; Colitis; Mucous—Intestines; Enteroptosis—Iodine; Iodism—Iron; Neuroses—Lead; Chronic Poisoning—Meningitis; Leptomenigitis—Menopause—Neurasthenia—Obstruction, Intestinal—Oesophagus; Neuroses—Sclerosis of Brain—Tetanus—Tumors of Brain—Uterine Adnexa; Inflammations of Ovary—Valerian.
 Hysteria of Childhood. See Spasms in Children; Automatic Movements.
 Hysterical Aphonia. See Respiratory Organs; Laryngeal Neuroses—Zinc; Nervous Disorders.
 Hysterical Chorea. See Chorea; Anomalous Varieties.
 Hysterical Crises. See Apomorphine.
 Hysterical Eclampsia Rotans. See Spasms in Children; Automatic Movements.
 Hysterical Mania. See Typhoid Fever.
 Hysterical Muscular Rigidity. See Muscles; Contracture.
 Hysterical Mutism. See Deaf-mutism.
 Hysterical Paralysis. See Cerebral Hemorrhage; Paralysis.
 Hysterical Paroxysm. See Nitrites; Nervous Disorders.
 Hysterical Peritonitis. See Peritoneum; Acute Peritonitis.
 Hysterical Spine. See Spine, Hysterical (Index).
 Hysteriform Disorders. See Parasites; Intestinal; Ascaris.
 Hystero-epilepsy. See Hyoscyamus—Nitrites; Nervous Disorders—Nitroglycerin; Nervous Disorders—Strontium; Nervous Disorders—Uterine Adnexa; Inflammations of Ovary.
 "Hysterogenic Zones." See Hysteria; Sensory Symptoms.
 Ice-bag. See Valvular Diseases of Heart; Acute Endocarditis.
 Ice-compresses. See Conjunctiva, Diseases of—Palpebræ; Injuries.
 Ice-cream Poisoning. See Cholera Morbus—Toxic Foods; Cream Poisoning.
 Ichorous Ulcers. See Phenacetin; Iodophenin.
 ICHTHYOL (*General Subject*). See Erysipelas—Leprosy—Thiol—Tuberculosis of Lungs; Semispecifics.
 Ichthyosis. See Animal Extracts; Thyroid; Cutaneous Diseases—Copper; Skin Diseases.
 Icteric Hue of Skin. See Yellow Fever.
 Icterus. See Abdomen; Contusion; Liver—Abdomen; Penetrating Wounds; Liver—Abortion—Cholelithiasis—Choluria—Jaundice (Index)—Mercury; Chlorides—Wounds (Septic) and Gangrene; Septicæmia.
 Icterus Gravis. See Jaundice; Toxæmia.
 Icterus Neonatorum. See Jaundice.
 Idiocy. See Animal Extracts; Thyroid—Deaf-mutism—Infantile Myxœdema—Insanity; Consecutive Dementia—Insanity; Idiocy and Imbecility—Sclerosis of Brain.
 Idiopathic Tetanus. See Tetanus. Idiopathic (Index).
 Idonaphthol. See Naphthalin.
 Igasuric Acid. See Nux Vomica.
 Ignatia. See Nux Vomica.
 Ileocolitis, Acute. See Infants, Diarrhœal Diseases of.
 Ileocolostomy. See Stomach, Surgery of; Intestines; Anastomosis.
 Ileoleostomy. See Stomach, Surgery of; Intestines; Anastomosis.
 Ileo-typhoid. See Typhoid Fever.
 Ileus. See Belladonna; External Uses—Obstruction, Intestinal—Uterine Adnexa; Tumors of Ovaries.
 Iliac Aneurism. See Aneurism.
 Ilium, Sarcoma of. See Hip-joint Disease.
 Ilium, Tumors of. See Hip-joint Disease.
 Illuminating Gas, Poisoning by. See Nitroglycerin; Antidotal Uses.
 Illusions. See Alcoholism—Insanity.
 Image, False. See Strabismus.
 Image, True. See Strabismus.
 Imbalance. See Strabismus; Latent.
 Imbecility. See Insanity; Idiocy and Imbecility—Insanity; Paranoia—Sclerosis of Brain.
 Impacted Fæces. See Urinary System, Diseases of (Surgical); Movable Kidney.

- Impairment of Vision. See Toxic Amblyopia.
 Imperforate Anus. See Stomach, Surgery of; Intestines; Enterotomy.
 Impetigo. See Creasote; Skin Diseases—Europhen; Cutaneous Disorders—Herpes—Hydrochloric Acid; Cutaneous Disorders—Potassium; Sozoiodolate—Quinine—Salol—Sulphur; Cutaneous Disorders—Zinc; Cutaneous Disorders.
 Impetigo Contagiosa. See Eczema—Variola; Vaccinia.
 Impetigo, Contagious. See Boracic Acid.
 Impetigo, Follicular. See Europhen; Cutaneous Disorders.
 Impetigo Herpetiformis. See Dermatitis Herpetiformis—Laryngitis; Symptomatic.
 Impetigo Herpetiformis of Hebra. See Dermatitis Herpetiformis.
 Implantation Cysts. See Tumors; Dermoids.
 Impotence. See Cantharides; Aphrodisiac—Ergot; Genital Disorders—Nux Vomica; Nervous Disorders—Penis and Testicles; Penis, Fracture of—Phosphorus; Nervous Disorders—Leprosy.
 Impotence, Sexual. See Neurasthenia.
 Impulse, Epigastric. See Valvular Diseases of Heart.
 Impulsive Acts. See Insanity; Morbid Impulses.
 Inanition Fever. See Nursing; Unsuccessful.
 Incontinence of Fæces. See Fæces, Incontinence of (Index).
 Incontinence of Pylorus. See Stomach, Diseases of; Functional Diseases.
 Incontinence of Urine. See Enuresis (Index)—Urine, Incontinence of (Index).
 Inco-ordination. See Locomotor Ataxia—Piperazin; Poisoning—Sulphonal; Physiological Action—Tumors of Brain; Tumors of Cerebellum—Tumors of Brain; Tumors of Great Ganglia.
 Increased Ocular Tension in Childhood. See Tension of Eyeball; Glaucoma.
 Incus, Removal of. See Middle Ear; Chronic Otitis.
 Indian Corn. See Corn-ergot.
 Indian Hemp. See Anhalonium Lewinii.
 Indian Method of Rhinoplasty. See Plastic Surgery; Rhinoplasty.
 Indian Poke. See Veratrum Viride.
 Indian Tobacco. See Lobelia.
 Indican in Urine. See Indicanuria.
 INDICANURIA (*General Subject*).
 Indigestion. See Ipecac—Magnesia; Antacid—Pregnancy, Disorders of—Sodium; Gastro-Intestinal Disorders—Spine, Diseases of; Tuberculosis—Stomach, Surgery of; Ulcer—Toxic Foods; Grain Poisoning—Uterus; Prolapse—Valvular Diseases of Heart; Tricuspid Regurgitation.
 Indigestion, Intestinal. See Intestinal Indigestion (Index).
 Indigo. See Indicanuria.
 Indol. See Indicanuria.
 Indolent Lymphitis. See Syphilis; Syphilides.
 Indoxyl. See Indicanuria.
 Indoxyl-sulphuric Potassium-indican. See Indicanuria.
 Indurated Plaque. See Syphilis; Initial Lesion.
 Induration, Parchment. See Syphilis; Initial Lesion.
 Induration, Squamous. See Syphilis; Initial Lesion.
 Inebriety. See Alcoholism.
 Infantile Anorexia. See Nursing.
 Infantile Apepsia. See Pepsin.
 Infantile Cerebral Palsy. See Encephalitis; Acute Non-suppurative.
 Infantile Colic. See Colic, Infantile (Index).
 Infantile Constipation. See Constipation, Infantile (Index).
 Infantile Convulsions. See Chloral Preparations—Spasms in Children.
 Infantile Diarrhœa. See Diarrhœa, Infantile (Index).
 Infantile Flatulence. See Flatulence, Infantile (Index).
 Infantile Hemiplegia. See Hypnotism.
 INFANTILE MYXEDEMA (*General Subject*).
 Infantile Palsy, Acute. See Strychnine; Nervous Disorders.
 Infantile Paralysis. See Paralysis, Infantile (Index).
 Infantile Pemphigus. See Syphilis; Congenital.
 Infantile Spinal Paralysis. See Spinal Cord; Poliomyelitis.
 Infantile Syphilis. See Syphilis.
 Infantile Uterus. See Uterus; Malformations.
 Infantile Vomiting. See Nursing.
 Infantilism. See Infantile Myxœdema.
 Infants, Acute Coryza of. See Nasal Cavities; Acute Rhinitis.
 Infants, Artificial Feeding of. See Nursing and Artificial Feeding.
 Infants, Artificial Foods for. See Nursing and Artificial Feeding.
 INFANTS, DIARRHOEAL DISEASES OF (*General Subject*). See Diarrhœa, Infantile (Index)—Menigitis; Leptomenigitis—Mercury; Chlorides—Mercury; Metallic.
 Infants, Feeding of. See Nursing and Artificial Feeding.
 Infants, Hæmorrhage of. See Syphilis; Congenital.
 Infants, Peritonitis in. See Peritoneum.
 Infarction, Hæmorrhagic. See Pulmonary Circulation; Embolism—Vascular System; Vascular Obstruction; Embolism.
 Infarctions in Brain. See Valvular Diseases of Heart; Acute Endocarditis.
 Infarctions in Intestines. See Valvular Diseases of Heart; Acute Endocarditis.
 Infarctions in Kidneys. See Valvular Diseases of Heart; Acute Endocarditis.
 Infarctions in Spleen. See Spleen, Diseases of—Valvular Diseases of Heart; Acute Endocarditis.
 Infarcts, Hæmorrhagic. See Infarction, Hæmorrhagic (Index).
 Infectious Vaginitis. See Vagina.
 Infectious Vulvitis. See Vagina; Vulva; Vulvitis.
 Infiltration. See Tumors.
 Infiltration, Gummy. See Syphilis; Period of Sequelæ.
 Infiltration, Pharyngo-Faucial. See Syphilis; General Infection.
 Inflammation, Acute. See Potassium; Purgatives.
 Inflammation, Cerebral. See Wounds of Head; Extradural Hæmorrhage.
 Inflammation, Dynamic. See Veratrum Viride.
 Inflammation, Erysipelatous. See Erysipelatous Inflammation (Index).
 Inflammation, Intestinal. See Intestines, Diseases of—Salicylic Acid; Salicyl-resorcin.
 Inflammation of Antrum. See Sinuses.
 Inflammation of Bladder. See Bladder, Inflammation of (Index).
 Inflammation of Bone. See Typhoid Fever.
 Inflammation of Brain. See Encephalitis.
 Inflammation of Conjunctiva. See Conjunctiva.
 Inflammation of Cranial Bones. See Wounds of Head; Diseases Involving Skull.
 Inflammation of Ethmoidal Sinus. See Sinuses.
 Inflammation of Fallopian Tubes. See Fallopian Tubes, Inflammation of (Index).
 Inflammation of Frontal Sinus. See Sinuses.
 Inflammation of Joints. See Joints, Inflamed (Index).
 Inflammation of Kidneys. See Sulphonal.
 Inflammation of Larynx. See Laryngitis (Index)—Typhoid Fever; Complications.
 Inflammation of Ovary. See Ovary, Inflammation of (Index).
 Inflammation of Scalp, Erysipelatous. See Wounds of Head; Abscess of Scalp.
 Inflammation of Skin. See Skin, Inflammation of (Index).
 Inflammation of Sphenoidal Sinus. See Sinuses.
 Inflammation of Tongue. See Tongue; Glossitis.
 Inflammation of Tonsils. See Tonsils, Inflammation of (Index).
 Inflammation of Vulvo-Vaginal Glands. See Vagina; Vulva; Vulvitis.
 Inflammations, Sthenic. See Veratrum Viride.
 INFLUENZA (*General Subject*). See Abortion—Anilipyrin—Antipyrin—Atropine—Calcium—Insanity; Acute Confusional—Insanity; Post-febrile—Laryngitis; Symptomatic—Mustard; Respiratory Tract—Phenacetin—Phenacetin; Lactophenin—Phenic (Carbolic) Acid; Respiratory Disorders—Phenocoll—Plague—Pneumonia, Catarrhal—Pregnancy Disorders of—Salicylic Acid; Antipyrine Salicylate—Salol—Salophen—Specific Infectious Fevers; Relapsing—Toxic Foods; Meat Poisoning.
 Infra-orbital Neuralgia. See Neuralgia—Strychnine; Nervous Disorders.
 Ingrowing Toe-nail. See Toe-nail, Ingrowing (Index).
 Inguinal Hernia. See Hernia.

- Inhalation, Hot Air. See Tuberculosis of Lungs; Inhalations.
- Inhalation, Steam. See Steam Inhalations (Index).
- Injection, High Rectal. See Infants, Diarrhoeal Diseases of.
- Injection, Intramuscular. See Orthoform; Local Anæsthesia.
- Injection, Intravenous. See Wounds (Septic) and Gangrene; Septicæmia.
- Injection Method in Hydrocele. See Penis and Testicles; Hydrocele.
- Injection of Alcohol. See Tumors of Breast.
- Injection of Saline Solution. See Saline Injections (Index)—Wounds (Septic) and Gangrene; Septicæmia.
- Injection, Rectal. See Rectal Injections (Index).
- Injection, Saline. See Saline Injections (Index).
- Injection, Vaginal. See Vaginal Injections (Index).
- Injuries of Arteries. See Vascular System.
- Injuries of Bladder. See Bladder, Injury of (Index).
- Injuries of Blood-vessels. See Vascular System.
- Injuries of Head. See Head, Injuries of (Index).
- Injuries of Kidney. See Kidney, Injuries of (Index).
- Injuries of Spine. See Spine, Diseases of; Wounds.
- Injuries of Skull. See Wounds of Head; Diseases Involving Skull.
- Injuries of Tendons. See Tendons; Wounds.
- Injuries of Thorax. See Thorax, Injuries of (Index).
- Injuries of Tongue. See Tongue; Injuries.
- Injuries of Veins. See Vascular System.
- Injuries, Vagino-Perineal. See Vagino-Perineal Injuries.
- Ink-stains. See Oxalic Acid.
- Inoculation, Haffkine's Method of. See Plague.
- Inoculation, Pasteur's. See Pasteur's Inoculation (Index).
- Inoculations, Haffkine's Anticholera. See Cholera Asiatica.
- Insane, Paralysis of. See Encephalitis; Chronic.
- INSANITY (*General Subject*). See Amylene-hydrate — Animal Extracts; Thyroid — Camphor; Mental Diseases — Catalepsy — Chloral; Mental Diseases — Exophthalmic Goitre — Hyoscymus — Hypnotism — Hysteria — Influenza — Menopause — Myxedema — Nursing and Artificial Feeding; Nursing — Paraldehyde.
- Insanity, Acute Confusional. See Insanity.
- Insanity, Alternating. See Insanity; Recurrent.
- Insanity, Circular. See Insanity; Recurrent.
- Insanity, Lactational. See Lactational Insanity (Index).
- Insanity of Pregnancy. See Insanity; Catatonia.
- Insanity, Post-typhoid. See Typhoid Fever; Complications.
- Insanity, Puerperal. See Puerperal Insanity (Index).
- Insect-bites. See Hydrogen Dioxide — Naphthalin; Cutaneous Disorders — Potassium; Alkaline Lotions — Wounds and Stings.
- Insects, Blood-sucking. See Malarial Fevers; Manner of Infection.
- Insect-stings. See Stings, Insect (Index).
- INSOLATION (*General Subject*).
- Insolational Insanity. See Insanity.
- Insomnia. See Amylene-hydrate — Anæmia — Anhalonium Lewinii — Atropine — Chloral; Mental Diseases — Cocainomania — Diabetes Mellitus; Gelsemium; Cerebral Disorders — Hypnotism; Functional Disorders — Influenza — Insanity — Iodine; Iodism — Leukæmia — Lupulus — Miliary Fever — Neurasthenia — Paraldehyde — Phenacetin; Thymacetin — Phosphorus; Nervous Disorders — Pseudoleukæmia — Sleeplessness (Index) — Specific Infectious Fevers; Dengue — Sulphonal — Thymol; Thymacetin.
- Insomnia of Infants. See Nursing; Unsuccessful.
- Insomnia, Senile. See Cannabis Indica.
- Inspiration, Cog-wheel. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
- Inspiration Pneumonia. See Pneumonia, Catarrhal.
- Instruments, Lubricant for. See Petroleum.
- Insufficiency, Aortic. See Aortic Insufficiency (Index).
- Insufficiency, Mitral. See Mitral Insufficiency (Index).
- Insufficiency, Muscular. See Strabismus.
- Insufficiency of Pulmonary Valves. See Valvular Diseases of Heart; Aortic Regurgitation.
- Intentional Tremor. See Sclerosis of Brain.
- Intercostal Muscles, Paralysis of. See Diphtheria.
- Intercostal Neuralgia. See Neuralgia, Intercostal (Index).
- Interlobular Emphysema. See Pulmonary Emphysema.
- Interlobular Pleurisy. See Empyema.
- Intermittent Diabetes. See Diabetes Mellitus.
- Intermittent Fever. See Cinchona—Copper; Malarial Fevers—Malarial Fevers—Nitric Acid; Internal Uses — Nitroglycerin; Miscellaneous Diseases — Nux Vomica; Blood Disorders — Phosphorus; Febrile Disorders — Potassium; Febri-fuge — Quinine — Urinary System, Diseases of; Pyelitis.
- Intermittent Hepatic Fever. See Liver; Angiocholitis.
- Intermittent Malaria. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
- Intermittent Strabismus. See Strabismus.
- INTERNAL EAR, DISORDERS OF (*General Subject*).
- Internal Hæmorrhage. See Hæmorrhage, Internal (Index).
- Internal Jugular Vein, Murmur in. See Vascular Diseases of Brain; Thrombosis of Sinuses.
- Internal Strabismus. See Strabismus.
- Interosseal Muscles, Wasting of. See Spinal Cord; Amyotrophic Sclerosis.
- Interspinal Hæmorrhage. See Meningitis; Spinal.
- Interstitial Hepatitis. See Cirrhosis of the Liver.
- Interstitial Keratitis. See Keratitis, Interstitial (Index).
- Interstitial Nephritis. See Strontium; Genito-urinary Disorders.
- INTERTRIGO (*General Subject*). See Ailol; Skin Disorders — Bismuth; Locally — Dermatitis Traumatica — Europhen; Cutaneous Disorders — Ichthyol; Cutaneous Disorders — Magnesia; External Uses — Salicylic Acid — Zinc; Cutaneous Disorders.
- Intertrigo of Ear. See External Ear.
- Intestinal Abscess. See Dysentery.
- Intestinal Anastomosis. See Stomach, Surgery of; Intestines.
- Intestinal Antiseptic. See Salicylic Acid; Bismuth Salicylate — Salicylic Acid; Naphthol Salicylate — Strontium; Gastro-Intestinal Disorders.
- Intestinal Canal, Actinomycosis of. See Actinomycosis.
- Intestinal Carcinoma. See Cholelithiasis — Intestines; Duodenum; Ulceration — Intestines; Tumors.
- Intestinal Catarrh. See Eucalyptus; Gastro-Intestinal Disorders — Intestines — Naphthalin; Intestinal Disorders — Thymol.
- Intestinal Catarrh, Chronic. See Strontium; Gastro-Intestinal Disorders.
- Intestinal Colls, Agglutination of. See Stomach, Surgery of; Intestines; Anastomosis.
- Intestinal Colic. See Colic, Intestinal (Index).
- Intestinal Dilatation. See Physostigma; Gastro-Intestinal Disorders.
- Intestinal Distension. See Stomach, Surgery of; Intestines; Enterotomy.
- Intestinal Dyspepsia. See Ox-gall.
- Intestinal Fermentation. See Salicylic Acid; Naphthol Salicylate — Salol — Strontium; Gastro-Intestinal Disorders.
- Intestinal Fluxes. See Cajuput-oil — Calcium; Diarrhoea — Camphor.
- Intestinal Foreign Bodies. See Obstruction; Intestinal.
- Intestinal Gangrene. See Stomach, Surgery of; Intestines; Resection.
- Intestinal Hæmorrhage. See Abdomen; Contusion — Abdomen; Penetrating Wounds — Adenitis; Chronic — Alum; Typhoid Fever — Cholelithiasis — Creasote; Hæmorrhage — Diphtheria — Dysentery — Ergot; Hæmorrhage — Intestines; Duodenum; Ulceration — Intestines; Tumors — Iron; Hæmorrhage — Kino — Krameria — Leukæmia — Myxedema — Sclerosis of Brain — Scorbutus — Spleen; Hypertrophy — Turpentine — Typhoid Fever — Vascular System; Vascular Obstruction; Thrombosis.
- Intestinal Hernia. See Vagina; Tumors of Vulva.
- Intestinal Indigestion. See Nitric Acid; Internal Uses — Nux Vomica; Gastro-Intestinal Disorders — Pancreatin; Digestive Disorders — Salol.
- Intestinal Infections of Children. See Sodium; Gastro-Intestinal Disorders.

- Intestinal Inflammations. See Salicylic Acid; Salicyl-resorcin.
- Intestinal Injuries. See Stomach, Surgery of; Intestines; Resection.
- Intestinal Intussusception. See Intussusception, Intestinal (Index).
- Intestinal Irrigation. See Intestines; Colitis—Intestines, Irrigation of (Index).
- Intestinal Lavage. See Infants, Diarrhœal Diseases of.
- Intestinal Leukæmia. See Leukæmia; Lymphatic.
- Intestinal Myomata. See Intestines, Tumors.
- Intestinal Myxomata. See Intestines; Tumors.
- Intestinal Obstruction. See Appendicitis—Belladonna; Spasmodic Disorders—Cholelithiasis—Constipation—Hernia—Intestines; Colon; Dilatation—Intestines, Tumors—Obstruction, Intestinal—Pancreas; Acute Pancreatitis—Peritoneum; Acute Peritonitis—Stomach, Surgery of; Intestines; Enterotomy—Stomach, Surgery of; Intestines; Resection—Stomach, Surgery of; Intestines; Thrombosis—Sulphur; Gastro-Intestinal Disorders.
- Intestinal Obstruction, Operations for. See Stomach, Surgery of; Intestines.
- Intestinal Papillomata. See Intestines; Tumors.
- Intestinal Parasites. See Parasites, Intestinal (Index).
- Intestinal Paresis. See Obstruction, Intestinal.
- Intestinal Perforation. See Intestines; Duodenum; Ulceration—Typhoid Fever.
- Intestinal Resection. See Stomach, Surgery of; Intestines.
- Intestinal Stenosis. See Intestines; Duodenum; Ulceration.
- Intestinal Strangulation. See Obstruction, Intestinal.
- Intestinal Stricture. See Obstruction, Intestinal—Stomach, Surgery of; Intestines; Anastomosis.
- Intestinal Tract, Lesions. See Abdomen, Injuries of the.
- Intestinal Tuberculosis. See Stomach, Surgery of; Intestines; Resection.
- Intestinal Tumors. See Intestines—Intestines; Tumors—Obstruction, Intestinal—Stomach, Surgery of; Intestines; Resection—Urinary System, Diseases of (Surgical); Movable Kidney.
- Intestinal Twisting. See Obstruction, Intestinal.
- Intestinal Ulceration. See Leukæmia—Silver; Gastro-Intestinal Disorders—Stomach, Surgery of; Intestines; Anastomosis.
- Intestinal Ulcers. See Dysentery.
- Intestinal Wounds. See Stomach, Surgery of; Intestines; Resection.
- INTESTINES (*General Subject*).
- Intestines, Abscess of. See Dysentery.
- Intestines, Atony of. See Constipation—Intestines; Colon; Dilatation—Physostigma; Gastro-Intestinal Disorders.
- Intestines, Carcinoma of. See Intestinal Carcinoma (Index)—Stomach, Surgery of; Intestines; Anastomosis.
- Intestines, Descent of. See Intestines; Enteroptosis.
- Intestines, Fibroma of. See Intestines; Tumors.
- Intestines, Foreign Bodies in. See Intestines; Tumors.
- Intestines, Gangrenous. See Hernia; Strangulated.
- Intestines, Hemorrhage from. See Intestinal Hemorrhage (Index).
- Intestines in Alcoholism. See Alcoholism; Chronic.
- Intestines, Infarctions of. See Valvular Diseases of Heart; Acute Endocarditis.
- Intestines, Irrigation of. See Dysentery—Infants, Diarrhœal Diseases of—Meningitis; Leptomenigitis.
- Intestines, Lipoma of. See Intestines; Tumors.
- Intestines, Myoma of. See Intestine; Tumors.
- Intestines, Papilloma of. See Intestines; Tumors.
- Intestines, Perforating Ulcers of. See Stomach, Surgery of; Intestines; Resection.
- Intestines, Perforation of. See Abdomen, Injuries of the—Uterine Adnexa; Tumors of Ovaries.
- Intestines, Resection of. See Hernia; Strangulated.
- Intestines, Ruptured. See Abdomen; Contusion.
- Intestines, Sarcoma of. See Intestines; Tumors.
- Intestines, Stricture of. See Stomach, Surgery of; Intestines; Anastomosis.
- Intestines, Surgery of. See Stomach and Intestines.
- Intestines, Tumors of. See Urinary System, Diseases of (Surgical); Movable Kidney.
- Intoxicant. See Absinthe—Alcohol.
- Intoxication, Acute Alcoholic. See Alcoholism.
- Intoxication, Alcoholic. See Opium—Wounds of Head; Extradural Hemorrhage.
- Intracranial Hemorrhage. See Hydrocephalus; Acute—Pertussis.
- Intracranial Hemorrhage, Traumatic. See Wounds of Head; Diseases Involving Skull.
- Intracranial Surgery, Technique. See Wounds of Head; Scalp.
- Intracranial Tumors. See Hydrocephalus.
- Intracystic Warts. See Tumors; Epithelial.
- Intragastric Paradism. See Stomach, Diseases of; Dilatation.
- Intragastric Galvanism. See Stomach, Diseases of; Dilatation.
- Intrapelvic Gummata. See Syphilis; Period of Sequelæ.
- Intraperitoneal Hemorrhage. See Abdomen; Contusions—Abdomen; Penetrating Wounds—Hemorrhage, Intrapertitoneal (Index).
- Intrathoracic Tumors. See Pleurisy; Acute.
- Intra-urethral Herpetic Lesion. See Syphilis.
- Intravenous Injections. See Wounds (Septic) and Gangrene; Septicæmia.
- Intraventricular Effusion. See Tumors of Brain.
- INTUBATION OF THE LARYNX (*General Subject*).
- See Croup; Membranous—Diphtheria—Laryngitis; Oedema.
- Intussusception, Intestinal. See Infants, Diarrhœal Diseases of; Acute Ileocolitis—Infants, Diarrhœal Diseases of; Inflammatory Diarrhœas—Liver; Tongue-like Lobes—Obstruction, Intestinal—Tumors of Rectum and Anus; Benign.
- Intussusception, Irreducible. See Stomach, Surgery of; Intestines; Resection.
- Inunctions, Mercurial. See Syphilis.
- Invagination, Intestinal. See Obstruction, Intestinal.
- Inversion of Foot. See Foot, Inversion of (Index).
- Inversion of Uterus. See Uterus, Inversion of (Index).
- Iodide-of-Mercury Eruption. See Dermatitis Medicamentosa.
- Iodide-of-Potassium Eruption. See Dermatitis Medicamentosa.
- Iodides. See Acne—Nursing; Breast-milk—Syphilis.
- IODINE (*General Subject*).
- See Airoil—Animal Extracts; Thymus—Animal Extracts; Thyroid—Aristol—Europhen—Goitre—Infantile Myxœdema—Naphthalin; Iodonaphthol—Ozone—Phenacetin; Iodophenin—Potassium; Sozoiodolate—Syphilis.
- Iodine Eruption. See Dermatitis Venenata—Erythema Medicamentosum—Iodine; Iodism.
- Iodine in Urine. See Urine, Iodine in (Index).
- Iodine Rhinitis. See Nasal Cavities; Acute Rhinitis.
- Iodine Test for Bile-pigment. See Choloria.
- Iodine, Thyro-. See Thyro-iodine (Index).
- Iodism. See Iodine.
- Iodoform. See Bright's Disease; Acute—Europhen—Goitre—Insanity; Post-operative—Iodine—Mustard—Phenacetin; Iodophenin—Resorcin; Resorcinol.
- Iodoform Emulsion. See Joints; Tubercular.
- Iodoform Eruption. See Dermatitis Venenata.
- Iodoform Injection. See Rheumatism; Chronic Articular.
- Iodoform Poisoning. See Sodium; Antidotal Uses.
- Iodoformogen. See Iodine.
- Iodoguaiacol. See Guaiacol.
- Iodol. See Iodine.
- Iodophenacetin. See Phenacetin; Iodophenin.
- Iodophenin. See Phenacetin.
- Iodosalicylic Acid. See Iodine.
- Iodothyron. See Infantile Myxœdema.
- IPECAC (*General Subject*).
- Ipecac Eruption. See Dermatitis Venenata.
- Ipecacuanha. See Dysentery—Ipecac.
- Ipecacuanhic Acid. See Ipecac.
- Ipomœa Purga. See Jalap.
- Iridectomy. See Cataract—Iris; Iritis—Iris; Sarcoma—Tension of Eyeball; Glaucoma.
- Iridochoroiditis. See Iris—Iris; Choroiditis.
- Iridocyclitis. See Iritis—Jaborandi; Ophthalmic Disorders—Lens; Anomalies of Position.
- Iridodialysis. See Iris; Iritis.
- Iridoplegia, Reflex. See Locomotor Ataxia; Pupillary Symptoms.
- Iris, Coloboma of. See Coloboma of Iris (Index).
- Iris, Cyst of. See Iris; Tumors.

- IRIS, DISORDERS OF (*General Subject*).
 Iris, Gumma of. See Iris; Tumors.
 Iris, Gummy Tumor of. See Syphilis; General Infection.
 Iris, Sarcoma of. See Iris; Sarcoma.
 Iris, Tremulousness of. See Lens; Congenital Anomalies.
 Iris, Tuberculosis of. See Iris; Iritis.
 Iritis. See Atropine; Disorders of Eye—Conjunctiva, Diseases of the—Gout—Iris, Ciliary Body, and Choroid—Keratitis—Leprosy—Physostigma; Ophthalmic Disorders—Plague—Syphilis; General Infection—Tension of Eyeball; Glaucoma—Typhoid Fever.
 Iritis, Rheumatic. See Colchicum; General Maladies—Jaborandi; Ophthalmic Disorders.
 IRON (*General Subject*). See Anæmia—Animal Extracts; Bone-marrow—Chlorosis—Nursing; Breast-milk.
 Iron Rust, Removal of. See Oxalic Acid.
 Irregular Heart. See Vascular-Cardiac Neuroses.
 Irregularities, Cardiac. See Cardiac Irregularities (Index).
 Irrigation, Intestinal. See Intestinal Irrigation (Index).
 Irrigation of Bowel. See Bowel, Irrigation of (Index).
 Irrigation of Colon. See Infants, Diarrhæal Diseases of.
 Irrigation, Urethral. See Urethral Irrigation (Index).
 Irritability, Nervous. See Syphilis; General Infection.
 Irritable Bladder. See Bladder, Irritable (Index).
 Irritant. See Mustard—Silver—Zinc; Physiological Action.
 Ischæmia, Esmarch's Artificial. See Fractures; Compound.
 Ischæmia, Retinal. See Optic Nerve and Retina; Optic Atrophy.
 Ischiatic Hernia. See Hernia; Rare Forms.
 Ischuria. See Pix Liquida; Poisoning.
 Iso-amyl-nitrite. See Nitrites.
 Isonaphthol. See Naphthalin.
 Italian Method of Rhinoplasty. See Plastic Surgery; Rhinoplasty.
 Itch. See Scabies (Index).
 Itch, Bakers'. See Eczema.
 Itching. See Eczema—Pruritus (Index)—Vagina; Leucorrhœa—Wounds and Stings.
 Itching of Perineum. See Vagina; Eczematous Vaginitis.
 Itching of Vulva. See Vulva, Itching of (Index).
 Itching, Severe. See Dermatitis Herpetiformis.
 Itrol. See Silver; Silver Lactate.
 Ixodes. See Wounds and Stings; Wood-tick.
- JABORANDI (*General Subject*).
 Jaboric Acid. See Jaborandi.
 Jaborine. See Jaborandi.
 Jacket, Plaster of Paris. See Plaster-of-Paris Jacket (Index).
 Jacket Poulrice. See Poulrice, Jacket (Index).
 Jacksonian Epilepsy. See Epilepsy, Jacksonian (Index).
 Jacob's Ulcer. See Palpebræ; Tumors.
 Jaesche-Arlt Operation. See Palpebræ; Distichiasis.
 Jaffe's Test. See Indicanuria.
 Jail-fever. See Typhus Fever.
 JALAP (*General Subject*).
 Jalapin. See Jalap.
 Jalapinic Acid. See Jalap.
 Jambava. See Jambul.
 JAMBUL (*General Subject*).
 Janet's Treatment in Gonorrhœa. See Urinary System, Surgical Diseases of; Gonorrhœa.
 Jasmine, Yellow. See Gelsemium.
 Jatropa. See Curara.
- JAUNDICE (*General Subject*). See Anæmia, Pernicious—Cholelithiasis—Choluria—Cirrhosis of the Liver; Biliary—Cirrhosis of the Liver; Portal—Colchicum; General Maladies—Copper; Poisoning—Erythema Multiforme—Erythema Symptomaticum—Hydrætin; Poisoning—Hydrætis; Catarrhal Disorders—Icterus (Index)—Influenza—Intestines; Duodenitis—Intestines; Duodenum; Ulceration—Intestines; Tumors—Jaborandi; Chronic Affections—Liver and Gall-bladder, Diseases of the—Malarial Fevers—Manganese—Mercury; Chlorides—Olive-oil—Ox-gall—Pancreas; Acute Pancreatitis—Pancreas; Tumors—Parasites; Echinococcus—Phenic (Carbolic) Acid—Phosphorus; Phosphates—Phosphorus; Poisoning—Pneumonia, Lobar—Pregnancy, Disorders of—Pseudoleukæmia—Rhubarb—Silver; Gastro-Intestinal Disorders—Sodium; Gastro-Intestinal Disorders—Specific Infectious Fevers; Dengue—Specific Infectious Fevers; Relapsing—Stomach, Diseases of; Phlegmonous Gastritis—Toxic Foods; Grain Poisoning—Typhoid Fever—Valvular Diseases of Heart; Acute Endocarditis—Wounds (Septic) and Gangrene; Pyæmia—Yellow Fever.
 Jaundice, Catarrhal. See Phenacetin; Lactophenin; Poisoning—Podophyllum—Salol.
 Jaundice, Hæmatogenous. See Potassium; Poisoning.
 Jaundice, Malignant. See Liver; Acute Yellow Atrophy.
 Jaundice of Polychroma. See Jaundice; Toxæmia.
 Jaw, Actinomycosis of. See Actinomycosis.
 JAW, DISEASES OF (*General Subject*).
 Jaw, Dislocation of Lower. See Dislocation.
 Jaw, Fracture of. See Fractures.
 Jaw, Lumpy. See Actinomycosis.
 Jaw-bones, Necrosis of. See Mercury; Untoward Effects.
 Jaws, Locking of. See Strychnine; Poisoning.
 Jendrassik's Test. See Locomotor Ataxia; The Reflexes.
 JEQUIRITY (*General Subject*).
 Jeroine. See Veratrum Viride.
 Jigger. See Wounds and Stings.
 Johnson's Test. See Albuminuria.
 Joint Disease, Tubercular. See Joint Tuberculosis (Index).
 Joint Enlargements. See Iodine; Scrofulosis.
 Joint Tuberculosis. See Cinnamon; Antiseptic—Hip-joint Disease—Iodine; Iodoform; Surgical Tuberculosis—Iodine; Surgical Tuberculosis—Tendons; Tenosynovitis.
 Joints, Abscess of. See Abscess of Joints (Index).
 Joints, Deformities of. See Rheumatism; Chronic Articular.
 Joints, Diseases of. See Osseous System; Bone Tuberculosis—Strontium; Constitutional Disorders.
 Joints, Extravasation into. See Scorbutus.
 Joints, Hæmorrhage into. See Hæmophilia.
 Joints, Inflamed. See Belladonna; External Uses—Cotton-plant.
 Joints, Inflammatory Disorders of. See Mercury; Metallic.
 Joints of Pelvis, Suppuration of. See Vascular System; Phlegmasia Alba Dolens.
 Joints, Painful. See Hysteria.
 Joints, Rheumatic. See Potassium; Alkaline Lotions.
 Joints, Sprained. See Sprains.
 JOINTS, SURGICAL DISEASES OF (*General Subject*).
 Joints, Swelling of. See Rheumatism.
 Joints, Swollen. See Specific Infectious Fevers; Dengue.
 Jolles's Test. See Choluria.
 Jungle Fever. See Malarial Fevers; Synonyms.
 JUNIPER (*General Subject*).
 Juniper, Oil of. See Acne.
 Juniperin. See Juniper.
 Justus's Syphilitic Reaction. See Syphilis.
- Kakké. See Beriberi.
 Kala-azar. See Beriberi.
 Kalagua. See Tuberculosis of Lungs; Semispecifics.
 Kalium. See Potassium.
 Keith's Method of Abdominal Examination. See Liver; Tumors.
 Kelis. See Surgical Diseases of the Skin and its Appendages; Keloid.
 Keloid. See Animal Extracts; Thyroid—Burns—External Ear—Ichthyol; Cutaneous Disorders—Surgical Diseases of the Skin and its Appendages; Cicatricial Tumors—Tumors—Tumors; Connective-Tissue Tumors.
 Keloid, Albert's. See Surgical Diseases of the Skin and its Appendages; Keloid.
 Keloid, Spurious. See Surgical Diseases of the Skin and its Appendages; Keloid.
 KERATITIS (*General Subject*). See Aristol; Eye Diseases—Atropine; Disorders of Eye—Boric Acid—Cornea, Diseases of the—Erythroxylin Coca and Cocaine; Eye—Gout; Irregular—Iodine; Aristol—Iris, Ciliary Body, and Choroid, Diseases of—Plague—Tension of Eyeball; Glaucoma—Typhoid Fever.

- Keratitis, Interstitial. See Keratitis—Syphilis; Congenital.
- Keratitis, Phlyctenular. See Cornea, Opacities of—Keratitis—Physostigma.
- Keratitis, Striate. See Keratitis.
- Keratitis, Suppurative. See Keratitis.
- Keratitis, Syphilitic Interstitial. See Deaf-mutism; Abnormalities of Eye.
- Keratitis, Vascular. See Animal Extracts; Suprarenal.
- Kerato-conjunctivitis. See Animal Extracts; Suprarenal.
- Keratosis Pigmentosa. See Surgical Diseases of the Skin and its Appendages; Verrucae.
- Keratosis Pilaris. See Acne Rosacea.
- Keratosis Senilis. See Surgical Diseases of the Skin and its Appendages.
- Kernig's Sign. See Meningitis; Leptomeningitis.
- Keuchhusten. See Pertussis.
- Kidney. See Nephritic (Index)—Renal (Index).
- Kidney, Abscess of. See Abscess of Kidney (Index).
- Kidney, Amyloid Degeneration of. See Amyloid Degeneration of Kidneys (Index)—Amyloid Kidney (Index).
- Kidney, Cirrhotic. See Bright's Disease; Chronic.
- Kidney, Congestion of. See Quinine; Contra-indications.
- Kidney, Contracted. See Bright's Disease; Non-exudative Chronic.
- Kidney, Cystic. See Hydronephrosis.
- Kidney Disease. See Bright's Disease (Index).
- Kidney, Diseases of. See Cantharides—Erythroxylon Coca and Cocaine—Ether; Contra-indications—Gout—Renal Diseases and Renal Surgery—Strontium; Gastro-intestinal Disorders.
- Kidney, Displaced. See Cholelithiasis.
- Kidney, Fatty Contracted. See Bright's Disease; Exudative Chronic.
- Kidney, Floating. See Floating Kidney (Index).
- Kidney, General Surgery of. See Urinary System, Diseases of (Surgical).
- Kidney, Hæmorrhage from. See Renal Hæmorrhage (Index).
- Kidney in Alcoholism. See Alcoholism; Chronic.
- Kidney, Infarctions in. See Valvular Diseases of Heart; Acute Endocarditis.
- Kidney, Inflammation of. See Sulphonol.
- Kidney, Injuries of. See Abdomen, Injuries of—Urinary System, Diseases of (Surgical); Nephrectomy.
- Kidney, Lardaceous. See Urinary System, Diseases of.
- Kidney, Large Red. See Bright's Disease; Exudative Chronic.
- Kidney, Large White. See Bright's Disease, Exudative Chronic.
- Kidney, Lesions of. See Diabetes Mellitus.
- Kidney, Movable. See Appendicitis—Hydronephrosis—Liver, Diseases of—Liver, Diseases of; Angiocholitis—Stomach, Diseases of; Gastrop-tosis—Urinary System, Diseases of (Surgical).
- Kidney, Movable, Diseased. See Urinary System, Diseases of (Surgical); Nephrectomy.
- Kidney, Permeability of. See Methylene-blue.
- Kidney, Resection of Part of. See Urinary System, Diseases of (Surgical).
- Kidney, Rupture of. See Abdomen; Contusion.
- Kidney, Secondary Contracted. See Bright's Disease; Exudative Chronic.
- Kidney, Senile. See Bright's Disease; Non-exudative Chronic.
- Kidney, Small, Granular, Fatty. See Bright's Disease; Exudative Chronic.
- Kidney, Small White. See Bright's Disease; Exudative Chronic.
- Kidney, Surgical. See Urinary System, Diseases of; Pyelitis.
- Kidney, Tuberculosis of. See Urinary System, Diseases of (Surgical); Nephrectomy—Urinary System, Diseases of (Surgical); Nephrotomy—Urinary System, Diseases of (Surgical); Resection—Urinary System, Surgical Diseases of; Vesical Tuberculosis.
- Kidney, Tumors of. See Liver; Cancer of Gall-bladder—Liver; Tumors—Spleen; Wandering—Urinary System, Diseases of (Surgical); Renal Calculus.
- Kidney, Variegated. See Bright's Disease; Exudative Chronic.
- Kidney, Waxy. See Urinary System, Diseases of.
- Kidney, Wounds of. See Abdomen; Contusion—Abdomen; Penetrating Wounds.
- Kinetum. See Cinchona.
- Kinic Acid. See Cinchona.
- KINO (*General Subject*).
- Kinoin. See Kino.
- Kinotannic Acid. See Kino.
- Kitasato Bacillus. See Plague.
- Klebs-Loeffler Bacillus. See Croup; Membranous—Diphtheria.
- Kleptomania. See Insanity; Morbid Impulses.
- Knee, Abscess of. See Scorbutus, Infantile.
- Knee-Chest Position. See Parturition, Abnormal.
- Knee, Dislocations of. See Dislocations.
- Knee, House-maid's. See Tendons; Bursitis.
- Knee, Pain in. See Hip-joint Disease.
- Knee, White Swelling of. See Joints; Tubercular.
- Knee-jerks. See Hysteria; Motor Symptoms.
- Knock-knees. See Orthopaedic Surgery.
- Koch, Bacillus of. See Tuberculosis of Lungs.
- Kocher's Operation for Excision of Tongue. See Tongue; Cancer.
- Koch's New T. R. Tuberculin. See Tuberculosis of Skin; Lupus Vulgaris.
- König's Operation for Prolapsed Rectum. See Rectum and Anus; Prolapse of Rectum.
- Koplik's Spots. See Measles.
- KRAMERIA (*General Subject*).
- Krameric Acid. See Krameria.
- Kraske's Operation. See Tumors of Rectum and Anus; Malignant Growths.
- Krause's Modification of Wolfe's Method of Skin-grafting. See Skin-grafting.
- Krause's Operation. See Neuralgia.
- Kussmaul, Pulsus Paradoxus of. See Vasculo-Cardiac Neuroses; Irregular Heart.
- Kyphotone. See Spine, Diseases of; Tuberculosis.
- La Grippe. See Influenza.
- Labarraque's Solution. See Sodium.
- Labia, Hypertrophy of. See Vagina; Tumors of Vulva.
- Labia Minora. Hypertrophy of. See Vagina; Vulva; Hypertrophy.
- Labia, Ulcerative Eruption of. See Vagina; Vulva; Tuberculous Vulvitis.
- Labial Cyst. See Hernia; Rare Forms; Perineal.
- Labial Hernia. See Hernia; Rare Forms; Perineal.
- Labial Malignant Growths. See Plastic Surgery.
- Labial Tumors. See Uterine Adnexa; Displacements of Ovaries.
- Labor. See Ergot—Influenza.
- Labor, Abnormal. See Parturition, Abnormal.
- Labor, Induction of. See Eclampsia—Glycerin.
- Labor, Tedious. See Cinnamon.
- Laborde's Method of Artificial Respiration. See Ether; Untoward Effects—Pulmonary Circulation; Atelectasis.
- Labor-pains. See Hypnotism.
- Labyrinthine Apoplexy. See Internal Ear; Effusion.
- Labyrinthine Effusion. See Internal Ear; Effusion.
- Labyrinthine Vertigo. See Internal Ear; Effusion.
- Lac Sulphuris. See Sulphur.
- Laceration, Cerebral. See Wounds of Head; Wounds of Brain.
- Laceration of Cervix. See Uterus.
- LACRYMAL APPARATUS, DISEASES OF THE (*General Subject*).
- Lacrimal Duct, Stricture of. See Lacrymal Apparatus.
- Lacrimal Fistula. See Lacrymal Apparatus; Secretory Apparatus.
- Lacrimal Gland, Atrophy of. See Lacrymal Apparatus; Secretory Apparatus.
- Lacrimal Gland, Dislocation of. See Lacrymal Apparatus; Secretory Apparatus.
- Lacrimal Gland, Inflammation of. See Lacrymal Apparatus; Dacryoadenitis.
- Lacrimal Gland, Tumors of. See Lacrymal Apparatus; Secretory Apparatus.
- Lacrymation. See Cornea; Foreign Bodies—Jaborandi; Poisoning—Keratitis—Lacrimal Apparatus, Diseases of the.
- Lactation. See Animal Extracts; Thyroid; Lactation—Glycosuria—Nursing and Artificial Feeding.
- Lactation, Defective. See Agalactia.
- Lactational Insanity. See Insanity; Acute Confusional—Insanity; Catatonia—Insanity; Lactational.

- Lactic Acid. See Phenacetin; Lactophenin—Phenic (Carbolic) Acid; Phenosalyl.
- Lactic Acid, Uffelmann's Test for. See Stomach, Diseases of; Carcinoma.
- Lactol. See Naphthalin.
- Lactonaphthol. See Naphthalin.
- Lactophen. See Insanity.
- Lactophenin. See Phenacetin; Derivatives.
- Lactophenin Poisoning. See Jaundice; Toxæmia.
- Lactophosphates. See Phosphorus.
- Lactose in Urine. See Glycosuria.
- LACTUCARIUM (*General Subject*).
- Lactucerin. See Lactucarium.
- Lactucic Acid. See Lactucarium.
- Lactucin. See Lactucarium.
- Lactyl-phenetidin. See Phenacetin; Lactophenin.
- Lagophthalmos. See Leprosy—Palpebrae.
- Lake Fever. See Malarial Fevers; Synonyms.
- Lamb Poisoning. See Toxic Foods; Meat Poisoning.
- Laminectomy. See Fractures of Vertebrae—Spine, Diseases of—Spine, Diseases of; Tuberculosis.
- Lancinating Pains. See Locomotor Ataxia.
- Land-leech. See Wounds and Stings.
- Landry's Paralysis. See Paralysis, Landry's (Index).
- Lanthopine. See Opium.
- Laparotomy. See Abdomen, Injuries of—Appendicitis—Peritoneum; Acute Peritonitis—Peritoneum; Tuberculous Peritonitis—Stomach, Surgery of; Ulcer—Urinary System, Surgical Diseases of; Rupture of Bladder.
- Laparotomy, Intestinal Obstruction after. See Obstruction, Intestinal.
- Laplace's Anastomotic Forceps. See Stomach, Surgery of; Intestines; Anastomosis.
- Lardaceous Disease of Spleen. See Spleen, Diseases of.
- Lardaceous Kidney. See Amyloid Kidney (Index)—Amyloid Degeneration of Kidneys (Index)—Urinary System, Diseases of.
- Lardaceous Liver. See Liver; Amyloid.
- Largin. See Silver; Unofficial Salts—Urinary System, Surgical Diseases of; Gonorrhœa.
- Laryngeal. See Larynx (Index).
- Laryngeal Adductor Paralysis. See Respiratory Tract; Laryngeal Neuroses.
- Laryngeal Adenoma. See Adenoma of Larynx (Index).
- Laryngeal Carcinoma. See Tumors of Larynx and Lungs; Sarcoma of Larynx.
- Laryngeal Crises. See Locomotor Ataxia; Tabetic Crises.
- Laryngeal Diphtheria. See Diphtheria.
- Laryngeal Hemorrhage. See Laryngitis, Acute.
- Laryngeal Neuroses, Motor. See Respiratory Organs, Neuroses of.
- Laryngeal Obstruction. See Pseudoleukæmia.
- Laryngeal Edema. See Diphtheria; Laryngeal—Larynx, Edema of (Index)—Tracheo-Laryngeal Operations; Thyrotomy—Urticaria.
- Laryngeal Ozæna. See Laryngitis; Chronic.
- Laryngeal Paralysis. See Exophthalmic Goitre—Influenza—Larynx, Paralysis of (Index)—Spinal Cord; Syringomyelia.
- Laryngeal Phthisis. See Silver; Pharyngeal Disorders.
- Laryngeal Polypi. See Erythroxydon Coca and Cocaine; Nose; Pharynx.
- Laryngeal Spasm. See Hysteria; Paroxysmal Symptoms—Laryngismus Stridulus (Index)—Pertussis—Potassium; Poisoning—Spasms in Children; Tetany.
- Laryngeal Stenosis. See Diphtheria; Laryngeal—Oxygen; Inhalations—Typhoid Fever.
- Laryngeal Syphilis. See Tracheo-Laryngeal Operations; Tracheotomy.
- Laryngeal Tensor Paralysis. See Respiratory Tract; Laryngeal Neuroses.
- Laryngeal Tuberculosis. See Cantharides; Respiratory Maladies—Creasote; Pulmonary Diseases—Larynx, Tuberculosis of (Index)—Menthol; Pulmonary Disorders—Tracheo-Laryngeal Operations; Tracheotomy—Tuberculosis of Lungs; Chronic Ulcerative Phthisis—Tumors of Larynx and Lungs; Carcinoma of Larynx.
- Laryngeal Tumefaction, Scarification of. See Laryngitis; Edema.
- Laryngeal Ulceration. See Larynx, Ulcers of (Index).
- Laryngismus. See Status Lymphaticus.
- Laryngismus Stridulus. See Aconite—Antipyrine; Nervous Disorders—Bromides; Chorea; Convulsive Maladies—Croup; Catarrhal—Gelsemium; Spasmodic Disorders—Ipecac—Laryngeal Spasm (Index)—Locomotor Ataxia; Tabetic Crises—Musk—Naso-pharynx; Adenoids—Nitroglycerin; Respiratory Disorders—Quinine; Antispasmodic—Respiratory Tract—Salicylic Acid; Antispasmin.
- LARYNGITIS (*General Subject*). See Benzoic Acid; Pharyngitis and Laryngitis—Benzoin—Chloral; Respiratory Diseases—Croup; Catarrhal—Diphtheria; Laryngeal—Formaldehyde; Respiratory Tract—Ichthyol; Miscellaneous Disorders—Jaborandi; Acute Congestion—Licorice; Respiratory Tract—Pertussis—Phenic (Carbolic) Acid; Asepsol—Phenic (Carbolic) Acid; Chlorphenol—Silver; Pharyngeal Disorders—Specific Infectious Fevers; Relapsing.
- Laryngitis, Catarrhal. See Laryngitis; Chronic—Typhoid Fever.
- Laryngitis, Membranous. See Diphtheria; Laryngeal—Measles.
- Laryngitis, Non-diphtheritic. See Diphtheria; Laryngeal.
- Laryngitis, Phthisical. See Larynx, Tuberculosis of (Index).
- Laryngitis, Pseudomembranous. See Pseudomembranous Laryngitis (Index).
- Laryngitis, Spasmodic. See Respiratory Tract.
- Laryngitis, Syphilitic. See Mercury; Chlorides; Local Uses.
- Laryngitis, Tubercular. See Acetic Acid; Nose and Throat—Iodine; Iodoform—Larynx, Tuberculosis of (Index).
- Laryngitis, Winter. See Laryngitis; Chronic.
- Laryngological Disorders. See Sodium.
- Laryngorrhœa. See Laryngitis; Chronic.
- Laryngotomy. See Tracheo-Laryngeal Operations.
- Laryngo-tracheotomy. See Tracheo-Laryngeal Operations.
- Larynx. See Laryngeal (Index).
- Larynx, Adenoma of. See Tumors of Larynx and Lungs; Larynx.
- Larynx, Anæsthesia of. See Erythroxydon Coca and Cocaine; Topical Administration.
- Larynx, Angioma of. See Tumors of Larynx and Lungs; Larynx.
- Larynx, Cancer of. See Tumors of Larynx and Lungs; Malignant Tumors of Larynx.
- Larynx, Cancerous Ulcer of. See Tuberculosis of Larynx.
- Larynx, Chondroma of. See Tumors of Larynx and Lungs; Larynx.
- Larynx, Cicatricial Stenosis of. See Intubation.
- Larynx, Cysts of. See Tumors of Larynx and Lungs; Larynx.
- Larynx, Diphtheritic Obstruction of. See Diphtheria; Laryngeal—Intubation.
- Larynx, Diseases of. See Pulmonary Circulation; Hemorrhage.
- Larynx, Epithelioma of. See Tumors of Larynx and Lungs; Larynx.
- Larynx, Fibroma of. See Tumors of Larynx and Lungs; Larynx.
- Larynx, Foreign Bodies in. See Croup; Catarrhal—Intubation—Respiratory Passages—Tracheo-Laryngeal Operations; Thyrotomy.
- Larynx, Fractures of. See Fractures.
- Larynx, Growths in. See Intubation.
- Larynx, Inflammation of. See Laryngitis (Index)—Typhoid Fever; Complications.
- Larynx, Inflammation of Cartilage of. See Typhoid Fever.
- Larynx, Intubation of. See Intubation of Larynx (Index).
- Larynx, Lipoma of. See Tumors of Larynx and Lungs; Larynx.
- Larynx, Malignant Tumors of. See Tumors of Larynx and Lungs; Larynx.
- Larynx, Membranous Obstruction of. See Intubation.
- Larynx, Edema of. See Intubation—Iodine; Iodism—Laryngeal Edema (Index)—Laryngitis—Plague—Potassium; Poisoning—Respiratory Passages; Larynx—Typhoid Fever.
- Larynx, Papilloma of. See Tumors of Larynx and Lungs; Larynx.
- Larynx, Paralysis of. See Diphtheria—Hysteria; Motor Symptoms—Laryngeal Paralysis (Index)—Nerves, Peripheral; Localized Neuritis—Esophagus; Paralysis—Esophagus; Tumors.

- Larynx, Rheumatism of. See Laryngitis.
- Larynx, Sarcoma of. See Tumors of Larynx and Lungs; Malignant Tumors of Larynx.
- Larynx, Syphilis of. See Tumors of Larynx and Lungs; Carcinoma of Larynx.
- Larynx, Syphilitic Ulcer of. See Tuberculosis of Larynx.
- Larynx, Trachoma of. See Laryngitis; Chronic.
- Larynx, Tuberculosis of. See Creasote; Pulmonary Diseases—Laryngeal Tuberculosis (Index)—Laryngitis, Tubercular (Index)—Resorcin—Tuberculosis of Larynx—Tumors of Larynx and Lungs; Carcinoma of Larynx.
- Larynx, Tuberculous Ulceration of. See Larynx, Ulcers of (Index)—Orthoform—Menthol; Pulmonary Disorders.
- Larynx, Tumors of. See Tracheo-Laryngeal Operations; Thyrotomy—Tumors of Larynx and Lungs.
- Larynx, Ulcers of. See Creasote; Ulcerations—Larynx, Tuberculous Ulceration of (Index)—Leukæmia—Tuberculosis of Larynx—Tumors of Larynx and Lungs; Carcinoma of Larynx.
- Lassar's Paste. See Dermatitis Traumatica—Herpes Facialis.
- "Lata." See Chorea; Anomalous Varieties; Saltatory.
- Latent Concomitant Strabismus. See Strabismus; Latent.
- Latent Convergent Strabismus. See Strabismus; Latent.
- Latent Strabismus. See Strabismus.
- Latent Vertical Strabismus. See Strabismus; Latent.
- Lateral Curvature. See Spine, Diseases of; Tuberculosis.
- Lateral Curvature, Rotary. See Spine, Diseases of; Scoliosis.
- Lateral Homonymous Hemianopsia. See Hemianopsia, Lateral Homonymous (Index).
- Lateral Sclerosis, Amyotrophic. See Amyotrophic Lateral Sclerosis (Index).
- Lateral Sclerosis, Primary. See Spinal Cord; Amyotrophic Sclerosis.
- Lateral Sclerosis, Secondary. See Spinal Cord; Primary Lateral Sclerosis.
- Lateral Sinuses, Wounds of. See Wounds of Head; Wounds of Sinuses of Brain.
- Lateral Ventricles, Surgery of. See Wounds of Head; Surgery of Lateral Ventricles.
- Lathyrism. See Beriberi.
- Laudanine. See Opium.
- Laudanosine. See Opium.
- Laudanum. See Opium.
- Laudanum, Sydenham's. See Opium.
- Laughinggas. See Nitrous Oxide.
- Lavage. See Abdomen; Contusions—Fatty Heart; Fatty Degeneration; Prognosis—Infants, Diarrhæal Diseases of—Pregnancy, Disorders of—Stomach, Diseases of; Carcinoma—Stomach, Diseases of; Dilatation—Stomach-washing (Index)—Uræmia.
- Lavage of Intestines. See Infants, Diarrhæal Diseases of.
- Laveran's Plasmodium. See Malarial Fevers.
- Laxative. See Aloes—Buckthorn—Glycerin—Licorice—Magnesia—Olive-oil—Sulphur; Gastro-Intestinal Diseases—Phosphorus—Phosphorus; Phosphates.
- Lazaretto. See Leprosy.
- Le Nobel's Test. See Acetonuria.
- LEAD (*General Subject*).
- Lead Amaurosis. See Nux Vomica.
- Lead Colic. See Belladonna; Spasmodic Disorders—Ether; Therapeutics—Lead—Magnesia.
- Lead Encephalopathy. See Lead; Chronic Poisoning—Tumors of Brain.
- Lead Palsy, Progressive. See Strychnine; Nervous Disorders.
- Lead Paralysis. See Paralysis, Lead (Index).
- Lead Plaster. See Olive-oil.
- Lead Poisoning. See Angina Pectoris; Tobacco, Tea, etc.—Insanity; Acute Confusional—Iodine—Sulphur; Respiratory Disorders.
- Ledgeriana. See Cinchona.
- Leech, Liver. See Parasites; Distoma Hepaticum.
- Leech-bites, Hemorrhage from. See Silver; Surgical Disorders.
- Leeches. See Cystitis—Dilatation of the Heart—Meningitis; Leptomeningitis—Middle Ear; Acute Otitis.
- Leeching. See Jaws; Alveolar Abscess—Orbit; Orbital Cellulitis—Pleurisy; Acute—Pneumonia, Catarrhal.
- Left Ventricle, Hypertrophy of. See Valvular Diseases of Heart; Aortic Regurgitation—Valvular Diseases of Heart; Aortic Stenosis—Vascular System; Arteriosclerosis.
- Leg, Cramps in Calves of. See Toxic Foods; Meat Poisoning.
- Leg, Cramps in Muscles of. See Zinc; Poisoning.
- Leg, Fractures of. See Fractures.
- Leg, Marble-. See Vascular System; Phlegmasia Alba Dolens.
- Leg, Milk-. See Typhoid Fever—Vascular System; Phlegmasia Alba Dolens.
- Leg, Numbness in. See Spinal Cord; Landry's Paralysis.
- Leg, (Edema of). See Uterine Adnexa; Tumors of Ovaries.
- Leg, Paralysis of One. See Wounds of Head; Wounds of Brain.
- Leg, Shortening of. See Dislocations of Hip—Fractures of Femur.
- Leg, Tingling Pains in. See Spasms in Children; Tetany.
- Leg, White-. See Vascular System; Phlegmasia Alba Dolens.
- Legal's Test. See Acetonuria.
- Leg-ulcers. See Erythema Scrofulosorum—Vascular System; Varix.
- Leiomyoma. See Tumors; Myomata.
- Lembert Suture. See Stomach, Surgery of; Intestines; Enterorrhaphy.
- Lemon, Essential Salt of. See Oxalic Acid.
- LENS, DISEASES OF (*General Subject*).
- Lenticonus. See Lens; Congenital Anomalies.
- Leontiasis Ossium. See Acromegaly—Osseous System; Ostitis.
- Lepra. See Cantharides; Skin Diseases—Copaiba; Skin Diseases—Creasote; Skin Diseases—Hydrochloric Acid; Cutaneous Disorders—Leprosy—Pix Liquida; Cutaneous Disorders.
- Lepra Vulgaris. See Naphthalin; Cutaneous Disorders.
- Lepromata of Leloir. See Leprosy; Tubercular.
- LEPROSY (*General Subject*). See Ainhum—Ainol; Disorders of Skin—Animal Extracts; Thyroid; Leprosy—Chaulmugra-oil—Mercury; Iodide—Scleroderma—Spinal Cord; Syringomyelia—Variola; Vaccinia.
- Leptomeningitis. See Encephalitis—Hydrocephalus; Acute—Meningitis—Spinal Cord; Myelitis.
- Leptomeningitis, Serous. See Meningitis.
- Leptomeningitis, Suppurative. See Meningitis.
- Leptomeningitis, Syphilitic. See Meningitis.
- Leptomeningitis, Tubercular. See Meningitis.
- Leptomeningitis, Tubercular Cerebro-Spinal. See Meningitis.
- Leptothrix Pulmonis. See Bronchitis; Fœtid.
- Leptothrix Vaginalis. See Vagina; Non-cystic Growths.
- Lethargic State. See Hypnotism.
- Lethargy. See Hysteria—Iodine; Iodoform; Untoward Effects—Typhoid Fever—Wounds of Head; Compression of Brain.
- Letiéviant-Estlander Operation. See Empyema.
- Lettuce. See Lactucarium.
- Leucin Crystals in Urine. See Liver; Acute Yellow Atrophy.
- Leucocythæmia. See Anæmia—Anæmia, Pernicious—Animal Extracts; Bone-marrow—Chlorosis—Leukæmia (Index).
- Leucocytic Leukæmia. See Leukæmia.
- Leucocytosis. See Leukæmia—Liver; Abscess—Liver; Angiocholitis—Malarial Fevers—Parasites; Trichina—Pertussis—Pleurisy; Acute—Pneumonia, Lobar—Stomach, Diseases of; Carcinoma—Typhoid Fever.
- Leucoderma. See Exophthalmic Goitre—Phenic (Carbolic) Acid; Cutaneous Disorders.
- Leucogen. See Sodium.
- Leucoma. See Cornea, Opacities of.
- Leucorrhœa. See Chronic Acid; Antiseptic—Copaiba—Copper; Genito-Urinary Diseases—Creasote; Venereal Diseases—Cubeb; Catarrhal Disorders—Endometritis—Formaldehyde; Gynecological Disorders—Hydrastis; Catarrhal Disorders—Hydrogen Dioxide; Purulent Affections—Ichthyol; Gynecological Disorders—Kino—Krameria—Lead; External Applications—Manganese; External Uses—Metritis—Potassium;

- Leucorrhœa.**
Alkaline Lotions—Quinine; Eccholic—Silver; Gynæcology—Sodium; Gynæcological Disorders—Thymol—Urinary System, Surgical Diseases of; Gonorrhœa in Women—Uterus; Inversion—Uterus; Prolapse—Vagina.
- LEUKÆMIA (General Subject).** See Anæmia, Pernicious—Animal Extracts; Bone-marrow—Animal Extracts; Splenic—Arsenic; Blood Disorders—Chlorosis—Leucocythæmia (Index)—Malarial Fevers—Pseudoleukæmia—Scorbutus, Infantile—Specific Infectious Fevers; Terminal Infections.
- Leukæmia, Splenic.** See Pseudoleukæmia.
- Leukæmic Retinitis.** See Optic Nerve and Retina; Retinitis.
- Leukoplakia.** See Resorcin—Tongue.
- Leulose in Urine.** See Glycosuria.
- Lichen.** See Diabetes Mellitus; Skin Complications—Hydrocyanic Acid; Cutaneous Disorders—Jaundice; Obstructive—Phenic (Carbolic) Acid—Pix Liquida; Cutaneous Disorders—Potassium; Alkaline Lotions—Scorbutus—Silver; Cutaneous Disorders—Sodium; Cutaneous Disorders—Specific Infectious Diseases; Dengue—Variola; Vaccinia.
- Lichen Planus.** See Dermatitis Exfoliativa—Eczema.
- Lichen Ruber.** See Eczema.
- Lichen Ruber Planus.** See Laryngitis; Symptomatic.
- Lichen Scrofulosum.** See Strontium; Cutaneous Disorders.
- Lichen Tropicus.** See Miliaria.
- Lichen Urticatus.** See Erythema Multiforme—Ichthyol; Cutaneous Disorders.
- LICORICE (General Subject).**
- Licorice, Wild.** See Jequrity.
- Lids.** See Palpebræ (Index).
- Lids, Granular.** See Silver; Ophthalmic Disorders.
- Lieben's Iodoform Test.** See Acetonuria.
- Liebig's Food.** See Malt.
- Lienuli.** See Spleen; Malformations.
- Ligation of Arteries.** See Vascular System; Injuries of Arteries; Rupture.
- Ligation Treatment.** See Aneurism.
- Ligature of Uterine Vessels.** See Uterus; Myoma.
- Light, Flashes of.** See Valvular Diseases of Heart; Aortic Regurgitation.
- Lightning-stroke.** See Surgical Diseases of the Skin and its Appendages.
- Lignin.** See Ipecac.
- Lignum Vitæ.** See Guaiac.
- Lily of the Valley.** See Convallaria Majalis.
- Limbs, Rhythmical Movements of.** See Hysteria; Ataxia.
- Lime.** See Calcium.
- Lime, Liver of.** See Sulphur.
- Lime, Sulphurated.** See Sulphur.
- Lime-water.** See Calcium.
- Limpricht's Test.** See Acetonuria.
- Lingual Papillitis.** See Tongue.
- Lingual Ulcers.** See Tongue; Ulceration.
- Linimentum Æruginis.** See Copper.
- Linimentum Calcis.** See Linum.
- Linimentum Terebinthine.** See Turpentine.
- Linseed.** See Linum.
- Linseed-oil.** See Linum.
- LINUM (General Subject).**
- Liomyomata.** See Tumors; Connective Tissue.
- Lip, Swollen Upper.** See Yellow Fever.
- Lipatin.** See Phosphorus.
- Lipidolite.** See Lithium.
- Lipoma.** See Hernia; Femoral—Tumors.
- Lipoma of Intestine.** See Intestines; Tumors.
- Lipoma of Kidney.** See Urinary System, Diseases of (Surgical); Tumors of Kidneys.
- Lipoma of Larynx.** See Tumors of Larynx and Lungs; Larynx.
- Lipoma of Lung.** See Tumors of Larynx and Lungs; Lungs.
- Lipoma of Rectum.** See Tumors of Rectum and Anus; Benign.
- Lipoma of Spinal Cord.** See Spine, Diseases of; Tumors.
- Lipomata of Suprarenal Capsules.** See Suprarenal Capsules, Tumors of.
- Lipomata of Vagina.** See Vagina; Non-cystic Growths.
- Lipomatosis Universalis.** See Fatty Heart and Obesity—Infantile Myxœdema.
- Lipomatous Neuritis.** See Nerves, Peripheral; Simple Neuritis.
- Lipomyxoma.** See Tumors; Myxomata.
- Lips, Carcinoma of.** See Mouth; Lips—Mouth, Lips; Tumors.
- Lips, Chancre of.** See Mouth; Lips; Carcinoma.
- Lips, Chapped.** See Mouth and Lips; Lips, Diseases of.
- Lips, Cracks of.** See Mouth; Lips.
- Lips, Deformities of the.** See Plastic Surgery.
- Lips, Diseases of.** See Mouth and Lips, Diseases of.
- Lips, Ectropion of the.** See Plastic Surgery.
- Lips, Fissures of.** See Mouth; Lips—Silver; Surgical Disorders.
- Lips, Herpes of.** See Herpes Facialis.
- Lips, Hypertrophy of the.** See Plastic Surgery.
- Lips, Inflammation of.** See Mouth; Lips.
- Lips, Nævi of.** See Mouth; Lips; Tumors.
- Lips, Paralysis of.** See Wounds of Head; Compression of Brain.
- Lips, Thickening of.** See Myxœdema.
- Lips, Tumors of the.** See Mouth; Lips—Plastic Surgery; Labial Malignant Growths.
- Lips, Ulcers of.** See Mercury; Poisoning.
- Lipuria.** See Chyluria.
- Liquorice.** See Licorice.
- Lithæmia.** See Albuminuria—Nitric Acid; Internal Uses—Potassium; Diuretics.
- Lithæmic Disorders.** See Sodium—Sulphur.
- Lithæmic Neurasthenia.** See Neuralgia.
- Litharge.** See Lead.
- Lithia.** See Gout.
- Lithiasis.** See Magnesia; Antacid.
- Lithiasis of the Conjunctiva.** See Conjunctiva.
- LITHIUM (General Subject).**
- Litholapaxy.** See Erythroxylon Coca and Cocaine; Topical Administration—Urinary System, Surgical Diseases of; Vesical Calculus.
- Lithotomy.** See Urinary System, Surgical Diseases of; Vesical Calculus.
- Lithotripsy.** See Erythroxylon Coca and Cocaine; Topical Administration.
- Litten's Diaphragm Phenomenon.** See Pleurisy; Chronic Dry.
- Liver, Abscesses of.** See Abscess, Hepatic (Index)—Dysentery; Amœbic—Liver, Diseases of; Abscess—Liver; Hydatid Cyst—Pancreas; Acute Pancreatitis—Parasites; Echinococcus—Typhoid Fever; Complications—Valvular Diseases of Heart; Acute Endocarditis; Septicæmia—Wounds (Septic) and Gangrene; Pyæmia.
- Liver, Acute Yellow Atrophy of.** See Acute Yellow Atrophy of Liver (Index).
- Liver, Albuminoid Infiltration of.** See Liver; Amyloid.
- Liver, Amyloid.** See Amyloid Liver (Index).
- Liver, Amyloid Degeneration of.** See Amyloid Liver (Index)—Surgical Diseases; Secondary Wound Fever.
- LIVER AND GALL-BLADDER, DISEASES OF THE (General Subject).**
- Liver, Arterial Cirrhosis of.** See Cirrhosis of the Liver.
- Liver, Aspiration of.** See Liver; Abscess.
- Liver, Atrophic Hobnailed.** See Cirrhosis of the Liver; Portal.
- Liver, Atrophic Nutmeg.** See Cirrhosis of the Liver; Portal.
- Liver, Cancer of.** See Cirrhosis of Liver; Portal—Liver; Abscess—Liver; Hydatids—Liver; Tumors—Parasites; Echinococcus.
- Liver, Carcinoma of.** See Liver, Cancer of (Index).
- Liver, Cardiac.** See Liver; Passive Congestion.
- Liver, Centrilobular Cirrhosis of.** See Cirrhosis of the Liver.
- Liver Cirrhosis due to Infectious Granulomata.** See Cirrhosis of the Liver; Sporadic.
- Liver, Cirrhosis of.** See Cirrhosis of the Liver—Copaiba—Gold; Nephritis—Hepatic Cirrhosis (Index)—Lead; Chronic Poisoning—Liver; Tumors—Mercury; Chlorides.
- Liver Cirrhosis of Focal Necrosis.** See Cirrhosis of the Liver; Sporadic.
- Liver, Cirrhosis with Calcification of.** See Cirrhosis of the Liver; Portal.
- Liver, Cyanotic Atrophy of.** See Liver; Passive Congestion.
- Liver, Cyanotic Induration of.** See Cirrhosis of the Liver; Portal.

- Liver, Diseases of. See Nitric Acid; Internal Uses.
- Liver, Enlarged. See Jaundice; Acute Infectious—Leukæmia—Liver, Diseases of the—Malarial Fevers—Parasites; Distoma Hepaticum—Pseudoleukæmia—Urinary System, Diseases of; Amyloid Kidney.
- Liver, Enlarged Fatty Cirrhotic. See Cirrhosis of the Liver; Portal.
- Liver, Expansile Regurgitation of. See Valvular Diseases of Heart; Tricuspid Regurgitation.
- Liver, Functional Inactivity of. See Potassium; Diuretics.
- Liver, Gummatous Syphilis of. See Cirrhosis of the Liver; Portal.
- Liver, Hæmorrhage from. See Abdomen; Contusions—Abdomen; Penetrating Wounds.
- Liver, Hydatid of. See Liver, Diseases of—Parasites; Echinococcus—Pleurisy; Acute.
- Liver, Hyperæmia of. See Sulphur; Cutaneous Disorders.
- Liver, Hypertrophic, Alcoholic Cirrhosis of. See Cirrhosis of the Liver; Portal.
- Liver, Hypertrophic Biliary Cirrhosis of. See Cirrhosis of the Liver; Biliary.
- Liver, Hypertrophic Cirrhosis of. See Cirrhosis of Liver—Liver, Acute Yellow Atrophy.
- Liver in Alcoholism. See Alcoholism; Chronic.
- Liver, Inflammation of. See Hepatitis (Index).
- Liver, Laceration of. See Abdomen; Contusions.
- Liver, Lesions of. See Abdomen; Contusions—Abdomen; Penetrating Wounds.
- Liver, Lymphadenoma of. See Liver; Tumors.
- Liver, Marantic Atrophy of. See Cirrhosis of the Liver; Portal.
- Liver, Mixed Cirrhosis of. See Cirrhosis of the Liver; Portal.
- Liver, Movable. See Liver, Diseases of the.
- Liver, Nutmeg. See Cirrhosis of Liver; Portal—Liver; Passive Congestion.
- Liver, Obstructive Cirrhosis of. See Cirrhosis of the Liver; Biliary.
- Liver of Lime. See Sulphur.
- Liver of Sulphur. See Sulphur, Liver of (Index).
- Liver, Pericellular Cirrhosis of. See Cirrhosis of the Liver.
- Liver, Pigmentary Cirrhosis of. See Cirrhosis of the Liver; Portal.
- Liver, Red Atrophy of. See Cirrhosis of the Liver; Portal.
- Liver, Rupture of. See Abdomen; Contusions.
- Liver, Sarcoma of. See Liver; Tumors.
- Liver, Sclerosis of. See Cirrhosis of the Liver.
- Liver, Secondary Cirrhosis of. See Cirrhosis of the Liver.
- Liver, Senile Atrophy of. See Cirrhosis of the Liver; Portal.
- Liver, Sporadic Cirrhosis of. See Cirrhosis of the Liver.
- Liver, Syphilitic Pericellular Cirrhosis of. See Cirrhosis of the Liver.
- Liver, Syphilitic Tumor of. See Parasites; Echinococcus.
- Liver, Tenderness of. See Cirrhosis of the Liver.
- Liver, Torpid. See Ammonium; Gastric Catarrh—Jalap—Strychnine; Gastro-Intestinal Disorders.
- Liver, Tumors of. See Aneurism; Abdominal Aorta—Hydronephrosis—Liver.
- Liver, Wounds of. See Abdomen; Contusion—Abdomen; Penetrating Wounds.
- Liver-leech. See Parasites; Distoma Hepaticum.
- Livid Macular Eruption. See Syphilis; Congenital.
- Lobar Pneumonia. See Pneumonia, Lobar (Index).
- LOBELIA (*General Subject*).
- Lobelia Acid. See Lobelia.
- Lobeline. See Lobelia.
- Lobster Poisoning. See Toxic Foods; Shell-fish Poisoning.
- Lobular Pneumonia. See Pneumonia, Catarrhal.
- Local Stimulant. See Stimulant, Local (Index).
- Localization, Cerebral. See Wounds of Head.
- Localization, Spinal. See Spine, Diseases of; Spinal Localization.
- Localized Peritonitis. See Uterine Adnexa; Inflammations of Tubes.
- Locking of Jaws. See Strychnine; Poisoning.
- Lock-jaw. See Tetanus.
- LOCOMOTOR ATAXIA (*General Subject*). See Alcoholice Neuritis—Animal Extracts; Orchitic—Antipyrine; Nervous Disorders—Boric Acid; Sodium Biphosphate—Copper; Nervous Disorders—Curara—Exalgin—Hydracetin—Jaborandi; Chronic Affec-
- tions—Joints; Charcot's Disease—Methylene-blue—Miliary Fever—Nerves, Peripheral; Multiple Neuritis—Neurasthenia—Obstruction, Intestinal—Phenacetin; Lactophenin—Phosphorus; Nervous Disorders—Physostigma; Spasmodic Disorders—Rheumatism; Chronic Articular—Salicylic Acid—Salol—Silver; Nervous Disorders—Spinal Cord; Myelitis—Strychnine; Nervous Disorders—Syphilis; Period of Sequelæ.
- Loganin. See Nux Vomica.
- Loin, Tumors in. See Urinary System, Diseases of (Surgical); Nephrotomy; Hydronephrosis—Urinary System, Diseases of (Surgical); Tumors of Kidney.
- London Paste. See Sodium.
- Londonderry Lithia Spring-water. See Lithium.
- Loose Bodies in Joints. See Joints.
- "Loose Shoulders." See Muscles; Dystrophies.
- Lordosis. See Muscles; Dystrophies.
- Loreta's Operation for Pyloric Stenosis. See Stomach, Surgery of; Gastrotoomy.
- Loretin. See Iodine; Derivatives.
- Losophan. See Creasote; Creasol Iodide—Iodine; Derivatives.
- Lower Extremity, Swelling of. See Vascular System; Phlegmasia Alba Dolens.
- Lower Limbs, Cramps in. See Toxic Foods; Phal-line Poisoning.
- Lubricant. See Chaulmugra-oil—Olive-oil—Petroleum.
- Lugol's Solution. See Iodine.
- Lumbago. See Antipyrine; Nervous Disorders—Erythroxylon Coca and Cocaine; Neuralgia—Ichthyol; Rheumatism—Piperazin—Quinine; Antipyrine Action—Rheumatism—Salicylic Acid—Salicylic Acid; Potassium Salicylate—Sulphur; Lithæmic Disorders—Turpentine.
- Lumbar Colotomy. See Stomach, Surgery of; Intestines; Colostomy.
- Lumbar Fistula. See Urinary System, Diseases of (Surgical); Ureterectomy.
- Lumbar Hernia. See Hernia; Rare Forms.
- Lumbar Nephrectomy. See Urinary System, Diseases of (Surgical); Nephrectomy.
- Lumbar Neuralgia. See Neuralgia; Special Branches.
- Lumbar Puncture. See Meningitis; Leptomeningitis.
- Lumbar Region, Tumor in. See Urinary System, Diseases of; Pyelitis.
- Lumbricoid Worms. See Worms, Lumbricoid (Index).
- "Lumpy Jaw." See Actinomycosis.
- Lunar Caustic. See Silver.
- Lungs. See Pulmonary (Index).
- Lungs, Abscess of. See Abscess of Lung (Index).
- Lungs, Actinomycosis of. See Actinomycosis.
- Lungs, Adenoma of. See Tumors of Larynx and Lungs; Lungs.
- Lungs, Bronchiectatic Cavities of. See Wounds and Injuries of Thorax; Pneumotomy.
- Lungs, Carcinoma of. See Tumors of Larynx and Lungs; Lungs.
- Lungs, Cavities in. See Creasote; Pulmonary Diseases—Tuberculosis of Lungs.
- Lungs, Chondromata of. See Tumors of Larynx and Lungs; Lungs.
- Lungs, Collapse of. See Pulmonary Circulation, Disorders of.
- Lungs, Congestion of. See Bronchitis—Oxygen; Inhalation—Pneumonia—Pulmonary Circulation, Disorders of—Pulmonary Congestion (Index)—Valvular Diseases of Heart; Mitral Stenosis.
- Lungs, Diseases of. See Erythroxylon Coca and Cocaine.
- Lungs, Echinococci of. See Parasites; Echinococcus.
- Lungs, Endothelioma. See Tumors of Larynx and Lungs; Lungs.
- Lungs, Gangrene of. See Phenic (Carbolic) Acid; Respiratory Disorders—Phenic (Carbolic) Acid; Chlorphenol—Pneumonia, Lobar—Pseudoleukæmia—Wounds and Injuries of Thorax; Foreign Bodies in Chest—Wounds and Injuries of Thorax; Pneumotomy—Wounds and Injuries of Thorax; Secondary Complications.
- Lungs, Hæmorrhage from. See Hæmoptysis (Index).
- Lungs, Hepatized. See Empyema.
- Lungs, Hernia of. See Wounds and Injuries of Thorax; Hernia of Lung—Wounds and Injuries of Thorax; Injuries of Pleura.

- Lungs, Hydatid Cysts of. See Wounds and Injuries of Thorax; Pneumotomy.
- Lungs, Hyperæmia of. See Pulmonary Circulation; Congestion.
- Lungs in Alcoholism. See Alcoholism; Chronic.
- Lungs, Lipomata of. See Tumors of Larynx and Lungs; Lungs.
- Lungs, Lymphosarcoma of. See Pneumonokoniosis.
- Lungs, Malignant Tumors of. See Tumors of Larynx and Lung; Lungs.
- Lungs, Edema of. See Magnesia; Edema—Myocarditis—Pulmonary Edema (Index)—Pulmonary Circulation; Pulmonary Edema—Vascular System; Vascular Obstruction; Fat-embolism.
- Lungs, Osteomata of. See Tumors of Larynx and Lungs; Lungs.
- Lungs, Passive Congestion of. See Valvular Diseases of Heart; Mitral Stenosis.
- Lungs, Perforation of. See Pleurisy; Acute.
- Lungs, Rupture of. See Wounds and Injuries of Thorax; Fractures—Wounds and Injuries of Thorax; Rupture of Lung.
- Lungs, Sarcoma of. See Tumors of Larynx and Lungs; Lungs.
- Lungs, Tubercular Cavities of. See Wounds and Injuries of Thorax; Pneumotomy.
- Lungs, Tuberculosis of. See Phthisis (Index)—Pulmonary Tuberculosis (Index)—Salicylic Acid; Guaiacol Salicylate—Tumors of Larynx and Lungs; Carcinoma of Lungs.
- Lungs, Tumors of. See Tumors of Larynx and Lungs.
- Lungs, Wounds of. See Wounds and Injuries of Thorax; Injuries of Pleura—Wounds and Injuries of Thorax; Wounds of Lungs.
- Lung-fever. See Pneumonia, Lobar.
- Lung-tissue, Collapse of. See Pseudoleukæmia.
- Lupoid Ulceration of Rectum. See Rectum and Anus; Non-malignant Ulceration.
- Lupulinic Acid. See Lupulus.
- Lupulinum. See Lupulus.
- LUPULUS (*General Subject*).
- Lupus. See Actinomycosis—Animal Extracts; Thyroid—Aristol; Skin Diseases—Camphor; Salicylated—Chaulmugra-oil—Copaiba; Skin Diseases—Copper; Skin Diseases—Erysipelas—Europhor; Cutaneous Disorders—Formaldehyde; Cutaneous Disorders—Ichthyol; Cutaneous Disorders—Iodine—Aristol—Mercury; Nitrates—Pyrogallol—Salicylic Acid; Camphor Salicylate—Silver; Cutaneous Disorders—Thiol—Tuberculosis of Skin—Zinc; Cutaneous Disorders.
- Lupus, Angiomatous. See Tuberculosis of Skin; Lupus Vulvaris.
- Lupus Erythematous. See Acne Rosacea—Phenic (Carbolic) Acid; Surgical Disorders—Phosphorus; Cutaneous Disorders—Pix Liquida; Cutaneous Disorders—Salicylic Acid—Tuberculosis of Skin.
- Lupus Exedens. See Tuberculosis of Skin; Lupus Vulvaris.
- Lupus Exfoliatus. See Tuberculosis of Skin; Lupus Vulvaris.
- Lupus Hypertrophicus. See Tuberculosis of Skin; Lupus Vulvaris.
- Lupus, Myxomatous. See Tuberculosis of Skin; Lupus Vulvaris.
- Lupus of Conjunctiva. See Conjunctiva; Tubercular Disease.
- Lupus of Pharynx. See Tonsils; Tumors.
- Lupus of Vulva. See Vagina; Vulva; Tuberculous Vulvitis.
- Lupus Papillomatosus. See Tuberculosis of Skin; Lupus Vulvaris.
- Lupus, Sclerotic. See Tuberculosis of Skin; Lupus Erythematous.
- Lupus Verrucosus. See Tuberculosis of Skin; Lupus Vulvaris.
- Lupus Vorax. See Tuberculosis of Skin; Lupus Vulvaris.
- Lupus Vulgaris. See Acetic Acid; Skin Diseases—Pix Liquida; Cutaneous Diseases—Strontium; Cutaneous Disorders—Tuberculosis of Skin.
- Lustgarten, Bacillus of. See Syphilis; Bacillus.
- Luxation. See Dislocations.
- Lycetol. See Piperazin.
- Lycoperdon Cyathiforme Bosc. See Toxic Foods; Edible Mushrooms.
- Lymph Tuberculosis. See Pseudoleukæmia.
- Lymphadenitis. See Silver; Unguentum Credé.
- Lymphadenoma. See Adenitis—Status Lymphaticus.
- Lymphadenoma, General. See Pseudoleukæmia.
- Lymphadenoma of the Liver. See Liver; Tumors.
- Lymphæmia. See Leukæmia; Lymphatic.
- Lymphangiectasis. See Silver; Unguentum Credé—Status Lymphaticus.
- Lymphangiectasis, Conjunctival. See Conjunctiva; Miscellaneous Disorders.
- Lymphangioma. See Status Lymphaticus—Tumors.
- Lymphangioma, Cavernous. See Tumors; Connective Tissue.
- Lymphangiomata. See Tumors; Angiomata.
- Lymphangitis. See Penis and Testicles; Inflammatory Affections—Pieric Acid—Silver; Surgical Diseases—Status Lymphaticus—Thiol—Vagina; Vulva; Vulvitis.
- Lymphangitis of Penis. See Penis and Testicles; Inflammatory Affections.
- Lymphatic Conjunctivitis. See Conjunctiva; Phlyctenular.
- Lymphatic Cyst. See Tumors; Connective Tissue.
- Lymphatic Glands, Enlarged. See Hernia; Femoral—Leukæmia—Pseudoleukæmia—Strontium; Constitutional Disorders—Surgical Diseases; Secondary Wound Fever—Syphilis; Primary Local Changes from Infection—Wounds (Septic) and Gangrene; Septicæmia.
- Lymphatic Glands, Hyperplasia of. See Status Lymphaticus.
- Lymphatic Glands, Mediastinal. See Mediastinum; Lymphatic Glands.
- Lymphatic Glands, Sarcoma of. See Status Lymphaticus.
- Lymphatic Glands, Swelling of. See Surgical Diseases of the Skin and its Appendages; Carbuncle.
- Lymphatic Leukæmia. See Leukæmia.
- Lymphatic Nævus. See Tumors; Connective Tissue.
- Lymphatic System, Disorders of. See Status Lymphaticus.
- Lymphatic Thrombosis. See Vascular System; Vascular Obstruction; Thrombosis.
- Lymphatic Tissues, Hypertrophy of. See Pseudoleukæmia.
- Lymphatic Vessels, Tumors of. See Tumors; Connective Tissue.
- Lymphatism. See Acromegaly—Status Lymphaticus.
- Lymphitis, Indolent. See Syphilis; Syphilides.
- Lymphocytic Leukæmia. See Leukæmia.
- Lymphœdema. See Status Lymphaticus; Lymphangiectasis.
- Lymphoid Bone-marrow, Hyperplasia of. See Status Lymphaticus.
- Lymphoma. See Status Lymphaticus; Lymphadenoma—Tumors.
- Lymphoma, Multiple Malignant. See Pseudoleukæmia.
- Lymphoma of Pancreas. See Pancreas; Tumors.
- Lymphorrhagia. See Elephantiasis—Status Lymphaticus; Lymphangiectasis.
- Lymphorrhœa. See Status Lymphaticus; Lymphangiectasis.
- Lymphosarcoma. See Adenitis—Status Lymphaticus; Sarcoma of Lymphatic Glands—Tumors.
- Lymphosarcoma, Malignant. See Pseudoleukæmia.
- Lymphosarcoma of Lung. See Pneumonokoniosis.
- Lymph-scrutum. See Parasites; Filaria.
- Lymph-tissues, Hyperplasia of. See Status Lymphaticus.
- Lysidin. See Piperazin.
- Lysol. See Pix Liquida.
- Lyssa. See Rabies.
- Lyssophobia. See Rabies.
- Lye. See Potassium.
- Lytta. See Cantharides.
- MACE (*General Subject*).
- Macowen's Method. See Aneurism.
- Macrocheilia. See Status Lymphaticus; Lymphangiectasis.
- Macrocytes. See Anæmia, Pernicious.
- Macroglossia. See Status Lymphaticus; Lymphangiectasis.
- Macrostoma. See Plastic Surgery.
- Macrotoin. See Cimicifuga.
- Macula. See Cornea, Opacities of.
- Macular Eruption, Livid. See Syphilis; Congenital.
- Macules. See Erythema Multiforme—Measles.

- Maculo-papules. See Rubella.
 Maddox Rod-test. See Strabismus.
 Madeira Wine. See Alcohol.
 Maggot. See Parasites; Intestinal; Oxyuris.
 Magnan's Sign. See Cocainomania.
 MAGNESIA (*General Subject*).
 Magnesia Enteroliths. See Obstruction, Intestinal.
 Magnesium. See Magnesia.
 Magnesium-Nitric Test. See Albuminuria.
 Magnesium Sulphate. See Oxalic Acid.
 Maidismus. See Toxic Foods; Grain Poisoning.
 "Main en Griffe." See Tendons; Tenosynovitis.
 Maisonneuve's "Caustic Arrows." See Zinc; Cutaneous Disorders.
 Majoon. See Cannabis Indica.
 Malacosteon. See Osseous System; Osteomalacia.
 Malaise. See Syphilis; General Infection.
 Malakin. See Salicylic Acid; Salicyl-paraphenetidin.
 Malar Bones, Fracture of. See Fractures.
 Malaria, Intermittent. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
 Malaria, Typho-. See Malarial Fevers.
 Malarial Cachexia. See Animal Extracts; Bone-marrow—Malarial Fevers.
 Malarial Chill. See Jaborandi; Fevers—Malarial Fevers.
 MALARIAL FEVERS (*General Subject*). See Abortion—Arsenic—Asaprol—Benzanilid—Cholera Asiatica—Cinchona—Copper—Eucalyptus—Gelsemium; Fevers—Gentian—Guaiaacol; Fevers—Hæmaturia—Hæmoglobinuria—Herpes Facialis—Hydrastis—Insanity: Post-febrile—Intermittent Fever (Index)—Iron—Jaundice; Toxæmia—Liver; Abscess—Liver; Active Congestion—Methylene-blue—Mycocarditis—Phenocoll—Potassium; Febrifuges—Quebracho; Fevers—Quinine—Specific Infectious Fevers; Malta—Specific Infectious Fevers; Relapsing—Tumors of Brain—Typhoid Fever; Complications—Valvular Diseases of Heart; Acute Endocarditis—Yellow Fever.
 Malarial Fevers, Hæmorrhagic. See Malarial Fevers; Hæmaturia—Malarial Fevers; Pernicious. Malarial Hæmaturia. See Hæmaturia, Malarial (Index).
 Malarial Hæmoglobinuria. See Malarial Fevers; Hæmaturia.
 Malarial Keratitis. See Keratitis.
 Malarial Neuritis. See Neuritis, Malarial (Index).
 Malarial Plasmodium. See Yellow Fever.
 Malarial Remittent Fever. See Malarial Fevers.
 MALL FERN (*General Subject*). See Parasites; Intestinal; Tape-worms.
 Malerba's Test. See Acetonuria.
 Malformations of Fallopian Tubes. See Uterine Adnexa.
 Malformations of Ovaries. See Uterine Adnexa.
 Malformations of Skull. See Wounds of Head; Diseases Involving Skull.
 Malformations of Uterus. See Uterus; Malformations of (Index).
 Malignant's Hooks. See Fractures of Patella.
 Malignant Adenoma of Endometrium. See Uterus; Carcinoma of Corpus Uteri.
 Malignant Degeneration of Scars. See Surgical Diseases of the Skin and its Appendages.
 Malignant Dermatitis. See Dermatitis Maligna.
 Malignant Disease. See Syphilis; General Infection—Tracheo-Laryngeal Operations; Tracheotomy.
 Malignant Disease of Vertebrae. See Spine, Diseases of; Tuberculosis.
 Malignant Growths. See Zinc; Cutaneous Disorders.
 Malignant Growths in Bladder. See Urinary System, Diseases of (Surgical); Renal Calculus.
 Malignant Growths of Kidney. See Urinary System, Diseases of (Surgical); Renal Calculus.
 Malignant Growths of Rectum. See Tumors of Rectum and Anus.
 Malignant Growths of Vagina. See Vagina.
 Malignant Jaundice. See Liver; Acute Yellow Atrophy.
 Malignant Lymphosarcoma. See Pseudoleukæmia.
 Malignant Neoplasms. See Mercury; Nitrates.
 Malignant Oedema. See Surgical Diseases.
 Malignant Onychia. See Nails; Diseases of.
 Malignant Papillary Dermatitis. See Dermatitis Maligna.
 Malignant Purpuric Fever. See Meningitis; Cerebro-Spinal.
 Malignant Pustule. See Pustules, Malignant (Index).
 Malignant Sore Throat. See Sodium, Laryngological Disorders.
 Malignant Tertian Fever. See Malarial Fevers; Astivo-Autumnal.
 Malignant Tumors. See Tumors.
 Malignant Tumors of Larynx. See Tumors of Larynx and Lungs; Larynx.
 Malignant Tumors of Lung. See Tumors of Larynx and Lungs; Lungs.
 Malingering. See Epilepsy.
 Malnutrition. See Marasmus (Index)—Nursing and Artificial Feeding; Signs of Unsuccessful—Ozone.
 MALT (*General Subject*).
 Malt Liquors. See Alcohol.
 Malta Fever. See Specific Infectious Fevers.
 Maltine. See Malt.
 Maltose. See Malt.
 Mammary Abscess. See Mammary Gland.
 Mammary Adenofibroma. See Adenofibroma of Breast (Index).
 Mammary Congestion. See Atropine.
 Mammary Gland. See Breast (Index).
 Mammary Gland, Cancer of. See Dermatitis Maligna.
 MAMMARY GLAND, DISEASES OF (*General Subject*).
 Mammary Neuralgia. See Neuralgia; Intercostal.
 Mandrake. See Podophyllum.
 MANGANESE (*General Subject*).
 Manganum. See Manganese.
 Mania. See Anhalonium Lewinii—Animal Extracts; Thyroid; Insanity—Camphor; Chloral—Chloral; Mental Diseases—Colocynth; Apoplexy; Mania—Digitalis; Nervous Diseases—Gelsemium; Cerebral Disorders—Hyoscyamus—Influenza—Insanity; Mania—Insanity; Acute Confusional—Insanity; Consecutive Dementia—Insanity; Melancholia—Insanity; Recurrent—Lead; Chronic Poisoning—Phosphorus; Nervous Disorders—Pregnancy, Disorders of—Tumors of Brain.
 Mania A Potu. See Alcoholism; Alcoholic Mania—Valerian.
 Mania, Acute Alcoholic. See Alcoholism.
 Mania, Acute Delirious. See Insanity; Acute Confusional.
 Mania, Hysterical. See Typhoid Fever.
 Mania, Suicidal. See Typhoid Fever.
 Maniacal Furor. See Shock.
 Manihot Utilissima. See Curara.
 Maracaibo. See Copaiba.
 Marasmius Oreades. See Toxic Foods; Edible Mushrooms.
 Marasmus. See Malt—Meningitis; Leptomeningitis—Nursing and Artificial Feeding—Salicylic Acid; Guaiaacol Salicylate—Toxic Foods; Grain Poisoning—Tremors; Paralysis Agitans—Uterine Adnexa; Tumors of Ovaries.
 Marble-leg. See Vascular System; Phlegmasia Alba Dolens.
 Marie's Theory. See Locomotor Ataxia.
 Mark, Mother's. See Wounds of Head; Tumors of Scalp.
 Mark, Port-wine. See Wounds of Head; Tumors of Scalp.
 Marmorek's Serum. See Serum, Marmorek's (Index).
 Marsden's Paste. See Paste, Marsden's (Index).
 Marsh Fever. See Malarial Fevers; Synonyms.
 Marsh Miasm. See Malarial Fevers; Synonyms.
 Marshall's Free Spot. See Empyema.
 Martial Preparations. See Iron.
 Massage. See Acne—Asthma—Chorea—Cirrhosis of the Liver; Portal—Constipation—Cornea, Opacities of—Dilatation of the Heart—Enccephalitis—Fractures—Gout—Hydronephrosis—Hysteria—Intestines; Colitis; Mucous—Intestines; Colon; Dilatation—Joints; Synovitis—Muscles; Infectious Myositis—Muscles; Traumatic Atrophy—Myocarditis—Nerves, Peripheral; Neuritis—Nerves, Peripheral; Sciatica—Nerves, Wounds and Injuries of—Orthopædic Surgery; Pes Planus—Rheumatism—Sprains—Stomach, Diseases of; Dilatation—Urinary System, Surgical Diseases of; Chronic Prostatitis.
 Massage, Pelvic. See Pelvic Massage (Index).
 Massage, Phono-. See Internal Ear.
 Massage, Pneumatic. See Internal Ear.

- Mastitis. See Mammary Gland.
 Mastitis, Tubercular. See Tumors of Breast; Tuberculosis.
 Mastoid, Empyema of. See Middle Ear.
 Mastoiditis. See Middle Ear.
 Mastoiditis, Bezold's. See Middle Ear; Mastoiditis.
 Masturbation. See Hypnotism; Vicious Habits—Insanity—Insanity; Catatonia—Insanity; Idiocy—Parasites; Intestinal; Oxyuris.
 Matricaria Chamomilla. See Chamomile.
 Maunsell's Operation. See Stomach, Surgery of; Intestines; Anastomosis.
 Maxillary Bones, Fracture of. See Fractures.
 Maxillary Gland, Carcinoma of. See Salivary Glands; Tumors.
 Maxillary Gland, Chondroma of. See Salivary Glands; Tumors.
 Maxillary Gland, Fibroma of. See Salivary Glands; Tumors.
 Maxillary Gland, Tumors of. See Salivary Glands; Tumors.
 Maxillary Sinus, Empyema of. See Orbit; Miscellaneous Diseases.
 Maxillary Sinus, Mucocoele of. See Orbit; Miscellaneous Diseases.
 May-apple. See Podophyllum.
 Maydl's Colostomy. See Stomach; Surgery of; Intestines; Colostomy.
 Maydl's Operation. See Urinary System, Surgical Diseases of; Injuries of Bladder.
 McBurney's Operation. See Appendicitis.
 McBurney's Point. See Appendicitis.
 McMunn's Elixir. See Opium.
 Meadow-saffron. See Colchicum.
 MEASLES (*General Subject*). See Abortion—Antipyrine—Benzoic Acid—Boric Acid—Copaiba; Physiological Action—Deaf-mutism; Acute Infectious Diseases—Dermatitis Medicamentosa—Diphtheria; Pharyngeal Cases—Insanity; Post-febrile—Laryngitis; Symptomatic—Morbilli (*Index*)—Mouth; Gangrenous Stomatitis—Nucleins—Parasites; Intestinal; Tape-worms—Phosphorus; Febrile Disorders—Potassium; Febrifuges—Quinine; Tonic—Rubella—Specific Infectious Fevers; Dengue—Sulphur; Cutaneous Disorders—Typhoid Fever; Complications.
 Measles, French. See Rubella.
 Measles-like Rash. See Variola; Vaccinia.
 Meat Poisoning. See Toxic Foods.
 Meatus, Irritation of. See Urinary System, Surgical Diseases of; Gonorrhœa.
 Meconate of Morphine. See Opium.
 Meconic Acid. See Opium.
 Meconidine. See Opium.
 Meconin. See Opium.
 Meconoisin. See Opium.
 Mediastinal New Growth. See Valvular Diseases of Heart; Aortic Stenosis.
 Mediastinal Tumors. See Dilatation of the Heart—Mediastinum; Tumors.
 Mediastinal Vascular Disorders and Injuries. See Mediastinum.
 Mediastino-pericarditis. See Mediastinum; Mediastino-Cardiac Disorders—Pericardium; Pericarditis; Chronic Adhesive.
 Mediastinum, Abscess of. See Mediastinum.
 MEDIASTINUM, DISORDERS OF THE (*General Subject*).
 Mediastinum, Injuries to. See Wounds and Injuries of Thorax; Injuries to Mediastinum.
 Medico-legal Considerations in Alcoholism. See Alcoholism.
 Mediterranean Fever. See Specific Infectious Fevers; Malta.
 Medulla, Tumors of. See Tumors of Brain.
 Medullary Plug. See Fractures.
 Megaloblasts. See Anæmia, Pernicious.
 Megalocytes. See Anæmia, Pernicious.
 Megalogastric. See Stomach, Diseases of; Dilatation.
 Melana. See Stomach, Diseases of; Carcinoma.
 Melanæmesis. See Stomach, Diseases of; Carcinoma.
 Melancholia. See Anhalonium Lewinii—Animal Extracts; Thyroid; Insanity—Cataplexy—Erythroxylon Coca and Cocaine; Nervous Disorders—Gold; Mental Disorders—Hyosciamus—Influenza—Insanity; Melancholia—Insanity; Acute Confusional—Insanity; Catatonia—Insanity; Consecutive Dementia—Insanity; Recurrent—Intestines; Colitis; Mucous—Iodine; Iodoform; Untoward Effects—Jaundice; Obstructive—Lead; Chronic Poisoning—Leprosy—Menopause—Neurasthenia—Pericardium; Pericarditis—Pregnancy, Disorders of—Stomach, Diseases of; Chronic Gastritis.
 Melanoma. See Arsenic; Tumors.
 Melanosarcoma. See Liver; Tumors.
 Melanosis. See Arsenic; Physiological Action; Skin—Malarial Fevers; Pathology; Acute Malarial Affections.
 Melanotic Sarcoma. See Tumors; Connective Tissue.
 Melanuria. See Liver; Tumors—Malarial Fevers; Malarial Hæmaturia.
 Melasma Suprarenale. See Addison's Disease.
 Membrane, False. See Hydrogen Dioxide; Diphtheria.
 Membranes in Stools. See Stools, Membranes in (*Index*).
 Membranous Conjunctivitis. See Conjunctiva.
 Membranous Croup. See Croup, Membranous (*Index*).
 Membranous Enteritis. See Intestines; Colitis; Mucous.
 Membranous Exudate on Tonsils. See Scarlet Fever; Severe.
 Membranous Laryngitis. See Laryngitis, Membranous (*Index*).
 Membranous Rhinitis. See Nasal Cavities; Croupous Rhinitis.
 Membranous Stomatitis. See Mouth.
 Ménière's Disease. See Bromides; Heart Disorders—Internal Ear—Jaborandi; Aural Vertigo—Middle Ear; Chronic Otitis—Pelleterine.
 Meningeal Extravasation. See Wounds of Head; Extradural Hæmorrhage.
 Meninges, Extravasation into. See Scorbutus.
 MENINGITIS (*General Subject*). See Aconite—Alcoholism; Acute—Cerebral Abscess—Encephalitis—Epilepsy—Erysipelas—Gelsmium; Cerebral Disorders—Head, Injuries of—Hydrocephalus—Influenza—Middle Ear; Acute Otitis—Optic Nerve and Retina; Optic Neuritis—Pneumonia. Catarrhal—Pneumonia, Lobar—Quinine; Contra-indications—Rheumatism; Acute—Specific Infectious Fevers; Terminal Infections—Salicylic Acid; Contra-indications—Typhoid Fever—Uræmia—Wounds of Head; Tumors of Scalp.
 Meningitis, Alcoholic. See Tumors of Brain.
 Meningitis, Cerebro-Spinal. See Belladonna; Cerebro-Spinal Disorders—Bright's Disease; Acute—Copper; Nervous Disorders—Deaf-mutism; Acute Infectious Diseases—Gelsmium—Meningitis; Acute Leptomeningitis—Mercury; Chlorides—Myocarditis—Typhoid Fever—Valvular Diseases of Heart; Acute Endocarditis; Septicæmia.
 Meningitis, Chronic. See Phosphorus; Nervous Disorders.
 Meningitis, Gummatous. See Insanity; Syphilitic.
 Meningitis, Spinal. See Meningitis; Spinal—Rheumatism; Muscular—Spinal Cord; Myelitis.
 Meningitis, Syphilitic. See Tumors of Brain.
 Meningitis, Tubercular. See Tumors of Brain.
 Meningocoele. See Encephalocele—Orbit—Spine, Diseases of; Spina Bifida.
 Meningocoele (Cranial). See Tumors; Cysts.
 Meningococcus. See Meningitis; Cerebro-Spinal.
 Meningo-encephalitis. See Encephalitis.
 Meningomyelitis, Syphilitic. See Locomotor Ataxia.
 Meningomyelocele. See Spine, Diseases of; Spina Bifida.
 Menispermum Coccullus. See Curara.
 MENOPAUSE, DISORDERS OF (*General Subject*).
 See Animal Extracts; Ovarian—Animal Extracts; Thyroid; Uterine Disorders—Cimicifuga—Eucalyptus; Gastro-Intestinal Disorders—Insanity; Climacteric—Manganese; Menstrual Disorders.
 Menorrhagia. See Cannabis Indica; Uterine Hæmorrhage—Digitalis; Physiological Action on Uterus—Endometritis—Gentian—Hæmophilla—Hydrastis; Hæmorrhage—Influenza—Ipecac; Hæmorrhage—Metritis—Turpentine—Uterus; Myoma—Uterus; Sarcoma—Uterus; Tuberculosis.
 Menstrual Subinvolution. See Metritis.
 Menstruation. See Goitre—Herpes Facialis—Nursing; Breast-milk—Pulmonary Circulation; Hæmorrhage.
 Menstruation, Absence of. See Amenorrhœa (*Index*).

- Menstruation, Delayed. See *Cimicifuga*—Mustard.
 Menstruation, Difficult. See *Dysmenorrhœa* (Index).
 Menstruation, Disorders of. See *Insanity*.
 Menstruation, Profuse. See *Menorrhagia* (Index)—
 Urinary System, Surgical Diseases of; *Gonorrhœa* in Women.
 Menstruation, Suppressed. See *Amenorrhœa* (Index)—*Liver*; *Active Congestion*.
 Menstruation, Vasomotor Disturbances of. See
 Nitrites; *Gynæcological Disorders*.
 Menstruation, Vicarious. See *Epistaxis*.
 Mental Aberration. See *Typhoid Fever*.
 Mental Disease. See *Insanity*.
 Mental Hebetude. See *Stomach, Diseases of*; *Dilatation*—*Vascular Diseases of Brain*; *Thrombosis*.
 Mental Torpidity. See *Wounds* (Septic) and *Gangrene*; *Septicæmia*.
 Mental Torpor. See *Myxœdema*.
 MENTHA (*General Subject*).
 Mentha Piperita. See *Mentha*—*Menthol*.
 Mentha Viridis. See *Mentha*.
 Menthiol. See *Menthol*.
 MENTHOL (*General Subject*). See *Mentha*—*Phenic*
 (*Carbolic*) *Acid*; *Phenosalyl*.
 Menthol-camphor. See *Camphor*.
 Menthol-chloral. See *Chloral*.
 Menthophenol. See *Menthol*.
 Menthoxol. See *Hydrogen Dioxide*.
 Merck's Serum. See *Leprosy*.
 Mercurial Fever. See *Syphilis*.
 Mercurial Inunctions. See *Syphilis*.
 Mercurial Stomatitis. See *Stomatitis*, *Mercurial*
 (Index).
 Mercuriol. See *Syphilis*.
 MERCURY (*General Subject*). See *Bright's Disease*;
 Acute—Nursing; *Breast-milk—Syphilis*.
 Mercury Poisoning. See *Iodine*—*Jaws*; *Necrosis*—
 Sulphur; *Respiratory Disorders*.
 Mercury Eruption. See *Dermatitis Venenata*—*Erythema Medicamentosum*.
 Merycism. See *Stomach, Diseases of*; *Functional Diseases*.
 Mesarteritis. See *Vascular System*; *Arteritis*.
 Mesarteritis Syphilitica. See *Syphilis*; *Primary Local Changes from Infection*.
 Mescal Button. See *Anhalonium Lewinii*.
 Mesenteric Blood-vessels, Thrombosis of. See
 Stomach, Surgery of; *Intestines*.
 Mesenteric Glands, Enlargement of. See *Status Lymphaticus*.
 Mesentery, Tumors of. See *Peritoneum*; *Tumors*.
 Metabolism. See *Animal Extracts*.
 Metacarpus, Dislocations of. See *Dislocations*.
 Meta-di-oxy-benzene. See *Resorcin*.
 Metallic Poisoning. See *Sulphur*; *Respiratory Disorders*.
 Metamorphopsia. See *Optic Nerve and Retina*.
 Metaphosphoric-Acid Test. See *Albuminuria*.
 Metastasis. See *Tumors*.
 Metastatic Abscesses. See *Vascular System*; *Arteritis*—*Wounds* (Septic) and *Gangrene*; *Pyæmia*.
 Metatarsus, Dislocations of. See *Dislocations*.
 Meteorism. See *Stomach, Diseases of*; *Phlegmonous Gastritis*—*Typhoid Fever*—*Uterine Adnexa*; *Tumors of Ovaries*.
 Methacetin. See *Phenacetin*.
 Methæmoglobin. See *Antipyrine*; *Poisoning*—*Nitrites*; *Physiological Action*.
 Methæmoglobinæmia. See *Phenacetin*; *Poisoning*—*Potassium*; *Chlorate*.
 Methozine. See *Antipyrine*.
 Methylsalicylic Acid. See *Gaultheria*.
 METHYLENE-BLUE (*General Subject*). See *Malarial Fevers*.
 Methyl-acetanilid. See *Exalgin*.
 Methyl-alcohol. See *Formaldehyde*.
 Methyl-aldehyde. See *Formaldehyde*.
 METHYL-BLUE (*General Subject*). See *Methylene-blue*.
 Methyl-ether of Pyrocatechin. See *Guaiaacol*.
 Methyl-glyoxalidin. See *Piperazin*; *Lyssidin*.
 Methyl-phenyl-acet-amide. See *Exalgin*.
 Methylpyrocatechin. See *Guaiaacol*.
 Methyl-salicylate. See *Gaultheria*—*Salicylic Acid*.
 Methyl-violet. See *Methyl-blue*.
 METRITIS (*General Subject*). See *Urinary System*,
 Surgical Diseases of; *Gonorrhœa* in Women—*Uterus*; *Inversion*.
 Metritis, Chronic. See *Ichthyol*; *Gynæcological Disorders*.
 Metritis, Puerperal. See *Creasote*; *Ulcerations*—*Sodium*; *Gynæcological Disorders*.
 Metritis, Septic. See *Peritoneum*; *Acute Peritonitis*.
 Metrorrhagia. See *Alum*—*Gentian*—*Hæmophilia*—
 Influenza—*Salicylic Acid*; *Antipyrine Salicylate*—
 Sodium; *Laryngological Disorders*—*Turpentine*—*Uterus*; *Inversion*—*Uterus*; *Myoma*.
 Mezereum Eruption. See *Dermatitis Venenata*.
 Miasmatic Fever. See *Malarial Fevers*; *Synonyms*.
 Microretins. See *Infantile Myxœdema*.
 Microcephalus. See *Wounds of Head*; *Diseases Involving Skull*.
 Microcephaly. See *Insanity*; *Idiocy*.
 Microcin. See *Naphthalin*.
 Micrococcus Lanceolatus. See *Meningitis*; *Cerebro-Spinal*.
 Microcytes. See *Anæmia*, *Pernicious*.
 Microphthalmos. See *Orbit*.
 Micturition, Hasty. See *Spinal Cord*, *Primary Lateral Sclerosis*.
 Middle-Ear Bones, Escape of. See *Wounds of Head*; *Diseases Involving Skull*.
 MIDDLE EAR, DISEASES OF (*General Subject*). See
 Chloral—*Quinine*; *Contra-indications*—*Salicylic Acid*; *Contra-indications*.
 Middle Ear, Disorders of. See *Ammonium*—*Animal Extracts*; *Thyroid*.
 Middle-Ear Suppuration. See *Hydrogen Dioxide*; *Aural Disorders*.
 Migraine. See *Acetanilid*; *Neuralgia*—*Ammonium*;
 Neuralgia—*Anilipyrin*—*Belladonna*; *Miscellaneous*—*Cannabis Indica*—*Cerium*; *Nervous Disorders*—*Chloral*; *Mental Diseases*—*Coffee*; *Caffeine*; *Cephalalgia*—*Epilepsy*—*Ether*; *Therapeutics*—*Ethyl-chloride*; *Neuralgia*—*Guarana*—*Ipecac*—*Menthol*; *Painful Disorders*—*Neuralgia*—
 Nitrites; *Neuralgia*—*Nitroglycerin*; *Nervous Disorders*—*Phenacetin*—*Salol*—*Salicylic Acid*—
 Salophen—*Syphilis*; *Infectious Secretions*.
 MILIARIA (*General Subject*). See *Laryngitis*;
 Symptomatic—*Parasites*; *Trichina*.
 Miliaria Alba. See *Rheumatism*; *Acute*—*Miliary Fever*.
 Miliaria Rubra. See *Rheumatism*; *Acute*.
 Miliary Anæurism. See *Anæurism*, *Miliary* (Index).
 Miliary Ophthalmia. See *Conjunctiva*; *Granular Conjunctivitis*.
 MILIARY FEVER (*General Subject*).
 Miliary Tuberculosis. See *Tuberculosis of Lungs*;
 Roentgen Rays.
 Miliary Tuberculosis, Acute. See *Specific Infectious Fevers*; *Terminal Infections*.
 Miliary Tuberculosis of Skin. See *Tuberculosis of Skin*.
 Miliun. See *Surgical Diseases of the Skin and its Appendages*.
 Milk, Breast—See *Nursing and Artificial Feeding*.
 Milk, Cows'. See *Nursing and Artificial Feeding*.
 Milk, Excessive Secretion of. See *Mammary Gland*;
 Galactorrhœa.
 Milk, Home-modification of. See *Nursing and Artificial Feeding*.
 Milk, Insufficient Secretion of. See *Agalactia*.
 Milk, Modification of, for Infants. See *Nursing and Artificial Feeding*.
 Milk of Sulphur. See *Sulphur*.
 Milk, Pasteurization of. See *Nursing and Artificial Feeding*.
 Milk, Peptonized. See *Pancreatin*.
 Milk, Sterilization of. See *Nursing and Infant-feeding*.
 Milk-laboratories. See *Nursing and Artificial Feeding*.
 Milk-leg. See *Leg, Milk* (Index).
 MILK-SICKNESS (*General Subject*).
 Millen's Test. See *Albuminuria*.
 Miller's Fluid. See *Potassium*; *Caustics*.
 Mill-wheel Sound. See *Wounds and Injuries of Thorax*; *Wounds of Heart*.
 Milzbrand. See *Anthrax*.
 Mind-blindness. See *Tumors of Brain*; *Tumors of Occipital Lobe*.
 Mineral Oil. See *Petroleum*.
 Miners' Cachexia. See *Parasites*; *Intestinal*; *Anchylostoma*.
 Mint. See *Mentha*.
 Mirbane, Essence of. See *Nitrobenzene*.
 Mirbane, Oil of. See *Nitrobenzene*.
 Miscarriage. See *Abortion* (Index)—*Influenza*.
 Mistura Magnesiæ et Asafœtidæ. See *Opium*.
 Mitigated Caustic. See *Potassium*.

- Mitigated Lunar Caustic. See Silver.
 Mitigated Stick. See Silver.
 Mitral Disease. See Vasculo-Cardiac Neuroses; Irregular Heart.
 Mitral Insufficiency. See Apocynum Cannabinum—Digitalis; Diseases of Heart.
 Mitral Regurgitation. See Dilatation of the Heart—Iron; Cardiac Diseases—Mercury; Chlorides—Myocarditis—Valvular Diseases of Heart; Mitral Regurgitation—Valvular Diseases of Heart; Pulmonary Stenosis—Valvular Diseases of Heart; Tricuspid Regurgitation.
 Mitral Stenosis. See Digitalis; Diseases of Heart—Valvular Diseases of Heart; Mitral Stenosis—Valvular Diseases of Heart; Pulmonary Regurgitation.
 Mixed Chancre. See Syphilis.
 Mixed Sore. See Syphilis.
 Mixed Treatment. See Syphilis.
 Moist Gangrene. See Vascular System; Vascular Obstruction; Thrombosis.
 Moist Wart. See Surgical Diseases of the Skin and its Appendages; Verrucae.
 Molar Pregnancy. See Pregnancy, Disorders of.
 Molded Splints. See Fractures.
 Moles. See Mercury; Nitrates—Tumors; Angiomata.
 Moles of Scalp. See Wounds of Head; Tumors of Scalp.
 Mollities Ossium. See Osseous System; Osteomalacia.
 Molluscum. See Copper; Skin Diseases.
 Molluscum Contagiosum. See Palpebrae; Tumors—Surgical Diseases of the Skin and its Appendages.
 Molluscum Epitheliale. See Surgical Diseases of the Skin and its Appendages; Molluscum Contagiosum.
 Molluscum Fibrosum. See Surgical Diseases of the Skin and its Appendages; Molluscum Contagiosum—Tumors; Connective Tissue—Tumors; Neurofibroma.
 Molluscum Sebaceum. See Surgical Diseases of the Skin and its Appendages; Molluscum Contagiosum.
 Monarticular Inflammation. See Specific Infectious Fevers; Relapsing.
 Monk's Hood. See Aconite.
 Monobromated Camphor. See Bromides—Camphor.
 Mono-chlor-ethane. See Ethyl-chloride.
 Monocular Diplopia. See Diplopia, Monocular (Index).
 Monocular Strabismus. See Strabismus.
 Monolateral Strabismus. See Strabismus.
 Monomania. See Hysteria—Insanity; Morbid Impulses.
 Monomethylcatechol. See Guaiacol.
 Monoplegia. See Cerebral Hemorrhage; Paralysis—Diabetes Mellitus—Encephalitis; Acute Non-suppurative—Hysteria; Motor Symptoms—Lead; Chronic Poisoning—Spinal Cord; Poliomyelitis—Syphilis; Period of Sequelae—Tumors of Brain.
 Monoplegia, Crural. See Vascular Diseases of Brain; Branches of Precerebral.
 Monsel's Solution. See Iron.
 Monsters. See Parturition, Abnormal.
 Moore's Dressing. See Fractures.
 Morbid Growths. See Sodium; Surgical Disorders.
 Morbid Impulses. See Insanity.
 Morbilli. See Haematuria—Measles.
 Morbus Coxarius. See Hip-joint Disease.
 Morbus Sacer. See Epilepsy.
 Morcellation. See Uterus; Myoma.
 Morgan's Trajector. See Wounds of Head; Gun-shot Wounds.
 Morning-sickness. See Pregnancy, Disorders of.
 Morphea. See Scleroderma.
 Morphia. See Morphine (Index).
 Morphine. See Alkaloids—Apomorphine—Opium—Toxic Foods; Ptomaines.
 Morphine Habit. See Hypnotism; Alcohol and Drug Habit—Morphinomania.
 Morphine in Urine. See Morphinomania.
 Morphine Poisoning. See Manganese; Antidote—Nitroglycerin; Antidotal Uses—Opium; Poisoning.
 Morphinism. See Atropine; Antidotal Uses—Morphinomania.
 MORPHINOMANIA (*General Subject*). See Cocainomania—Phosphorus; Nervous Disorders.
 Morvan's Disease. See Spinal Cord; Syringomyelia.
 Moselle Wine. See Alcohol.
 Mosetig-Moorhof Method. See Goitre.
 Mosquito. See Malarial Fevers—Parasites; Filaria.
 Mosquito-bites. See Dermatitis Venenata—Ipecac; Skin Disorders—Wounds and Stings.
 Mother's Mark. See Wounds of Head; Tumors of Scalp.
 Motor Aphasia. See Wounds of Head; Wounds of Brain.
 Mountain Anæmia. See Anæmia, Mountain (Index)—Specific Infectious Fevers; Dengue.
 Mountain-fever. See Specific Infectious Fevers; Dengue—Typhoid Fever.
 MOUNTAIN-SICKNESS (*General Subject*). See Hæmaturia.
 MOUTH AND LIPS, DISEASES OF THE (*General Subject*).
 Mouth, Blackish Eschars about. See Phenic (Carbolic) Acid; Poisoning.
 Mouth Breathing. See Naso-pharynx; Adenoids.
 Mouth, Canker Spots of. See Herpes.
 Mouth, Dry. See Glycerin—Gout—Hydrochloric Acid; Fevers—Jaborandi; Deficient Glandular Secretion—Salivary Glands; Xerostomia—Toxic Foods; Shell-fish Poisoning.
 Mouth, Herpes of. See Herpes.
 Mouth, Large. See Plastic Surgery; Macrostomia.
 Mouth, Operations upon. See Chloroform.
 Mouth, Ulceration of. See Infants, Diarrheal Diseases of—Leukæmia; Acute—Mercury; Poisoning—Mouth.
 Mouth, Ulcers of. See Silver; Surgical Disorders.
 Mouth, White Eschars about. See Phenic (Carbolic) Acid; Poisoning.
 Mouth, White Stains of. See Silver; Poisoning; Acute.
 Mouth, Whitened. See Oxalic Acid; Poisoning.
 Mouth-wash. See Hamamelis; Astringent—Thymol.
 Movable Kidney. See Kidney, Movable (Index).
 Movable Kidney, Diseased. See Urinary System, Diseases of (Surgical); Nephrectomy.
 Movable Liver. See Liver, Diseases of.
 Mucocæle of the Ethmoidal Sinus. See Orbit; Miscellaneous Diseases.
 Mucocæle of the Frontal Sinus. See Orbit; Miscellaneous Diseases.
 Mucocæle of the Maxillary Sinus. See Orbit; Miscellaneous Diseases.
 Muco-enteritis. See Intestines; Colitis; Mucous.
 Mucoid Sputum. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
 Muco-Purulent Expectoration. See Tuberculosis of Lungs; Phthisis Florida.
 Muco-Purulent Sputum. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
 Mucous Colic. See Intestines; Colitis; Mucous.
 Mucous Gastritis. See Stomach, Diseases of; Chronic Gastritis.
 Mucous Hemorrhages. See Turpentine.
 Mucous Membranes, Dryness of. See Atropine; Physiological Action—Belladonna Poisoning.
 Mucous Patches. See Herpes—Hydrochloric Acid—Penis and Testicles; Herpes Progenitalis—Potassium; Caustics—Silver; Surgical Disorders—Sodium; Gastro-Intestinal Disorders—Syphilis; Primary Local Changes from Infection.
 Mucous Patches in Throat. See Tonsils; Syphilitic Pharyngitis.
 Mucous Tubercles. See Syphilis; General Infection.
 Mucus in Stools. See Stools, Mucus in (Index).
 Muguet. See Mouth; Parasitic Stomatitis.
 Multilocular Empyema. See Empyema.
 Multiple Malignant Lymphoma. See Pseudoleukæmia.
 Multiple Neuritis. See Neuritis, Multiple (Index).
 Multiple Osteomyelitis. See Spine, Diseases of; Tuberculosis.
 Multiple Sclerosis. See Sclerosis, Multiple (Index).
 Mummification. See Wounds (Septic); Dry Gangrene.
 Mumps. See Benzoic Acid—Internal Ear; Labyrinthine Effusion—Parotitis (Index)—Penis and Testicles; Orchitis.
 Mural Injuries. See Wounds and Injuries of Thorax.
 Mural Suppuration. See Wounds and Injuries of Thorax; Secondary Complications.
 Muriatic Acid. See Hydrochloric Acid.
 Murmur, Diastolic. See Valvular Diseases of Heart; Aortic Regurgitation—Valvular Diseases of Heart; Pulmonary Regurgitation.
 Murmur, Heart. See Valvular Diseases of Heart;

- Mitral Regurgitation—Wounds and Injuries of Thorax; Wounds of Heart.
- Murmur in Internal Jugular Vein. See Vascular Diseases of Brain; Thrombosis of Sinuses.
- Murmur, Presystolic. See Valvular Diseases of Heart; Aortic Regurgitation—Valvular Diseases of Heart; Mitral Stenosis—Valvular Diseases of Heart; Tricuspid Stenosis.
- Murmur, Systolic. See Valvular Diseases of Heart; Acute Endocarditis—Valvular Diseases of Heart; Aortic Regurgitation—Valvular Diseases of Heart; Aortic Stenosis—Valvular Diseases of Heart; Mitral Regurgitation—Valvular Diseases of Heart; Pulmonary Stenosis—Valvular Diseases of Heart; Tricuspid Regurgitation.
- Murmur, Systolic Apex-. See Valvular Diseases of Heart; Aortic Regurgitation.
- Murphy Button. See Stomach, Surgery of; Intestines; Anastomosis.
- Musae Volitantes. See Vasculo-Cardiac Neuroses; Slow Heart.
- Muscaine. See Toxic Foods; Ptomaines—Toxic Foods; Poisonous Mushrooms.
- Muscaine Poisoning. See Toxic Foods; Poisonous Mushrooms.
- Muscle, Ossification of. See Muscles; Ossifying Myositis—Muscles, Surgical Diseases of; Muscular Dystrophies.
- Muscular Atrophy. See Animal Extracts; Thyroid—Exophthalmic Goitre—Locomotor Ataxia; Trophic Symptoms—Muscles; Dystrophies—Muscles; Infectious Myositis—Muscles; Surgical Diseases—Nerves, Wounds and Injuries of—Spinal Cord; Amyotrophic Sclerosis—Spinal Cord; Poliomyelitis—Vascular System; Phlegmasia Alba Dolens.
- Muscular Atrophy, Progressive. See Progressive Muscular Atrophy (Index)—Spinal Cord; Syringomyelia.
- Muscular Atrophy, Progressive Spinal. See Spinal Cord; Amyotrophic Sclerosis.
- Muscular Atrophy, Spinal. See Spinal Cord; Myelitis.
- Muscular Contraction. See Toxic Foods; Phalline Poisoning.
- Muscular Cramps. See Bright's Disease; Non-exudative Chronic—Diabetes Mellitus—Miliary Fever—Vascular System; Varix.
- Muscular Dislocation. See Muscles; Surgical Diseases.
- Muscular Hyperæsthesia. See Meningitis; Spinal.
- Muscular Hypertrophy. See Muscles, Diseases of.
- Muscular Insufficiency. See Strabismus, Latent.
- Muscular Pains. See Jaundice; Acute Catarrhal—Phenacetin—Salicylic Acid and the Salicylates—Salicylic Acid; Potassium Salicylate—Salicylic Acid; Strontium Salicylate.
- Muscular Pains in Legs. See Scorbutus.
- Muscular Power, Loss of. See Nerves, Wounds and Injuries of.
- Muscular Prostration. See Piperazin; Poisoning—Specific Infectious Fever; Dengue.
- Muscular Rheumatism. See Rheumatism.
- Muscular Rigidity. See Muscles, Rigidity of (Index).
- Muscular Rupture. See Muscles; Surgical Diseases.
- Muscular Spasm. See Encephalitis; Acute Non-suppurative—Exophthalmic Goitre—Nerves, Peripheral; Functional Disorders—Nitrites—Spine, Diseases of; Tuberculosis—Spine, Diseases of; Tumors.
- Muscular Spasm, Facial. See Neuralgia; Fifth Pair.
- Muscular Stiffness. See Spinal Cord; Amyotrophic Sclerosis.
- Muscular Strain. See Muscles; Surgical Diseases.
- Muscular Tremblings. See Encephalitis; Acute Non-suppurative.
- Muscular Tremor. See Tremor, Muscular (Index).
- Muscular Twitchings. See Twitchings, Muscular (Index).
- Muscular Weakness. See Neurasthenia—Osseous System; Osteomalacia—Nerves, Peripheral—Potassium; Poisoning—Sulphonals; Physiological Action.
- Muscle Trichina. See Parasites; Trichina.
- Muscle Tumors. See Tumors; Connective Tissue.
- Muscles, Atrophy of. See Beriberi.
- Muscles, Cramps of Leg-. See Zinc; Poisoning.
- MUSCLES, DISEASES OF (*General Subject*).
- Muscles, Extra-ocular, Paralysis of. See Strabismus.
- Muscles of Fingers, Atrophy of. See Spinal Cord; Syringomyelia.
- Muscles of Hands, Atrophy of. See Spinal Cord; Syringomyelia.
- Muscles of Legs, Rigidity of. See Tumors of Brain; Tumors of Corpus Callosum.
- Muscles of Mastication, Rigidity of. See Tetanus.
- Muscles of Trunk, Rigidity of. See Tumors of Brain; Tumors of Corpus Callosum.
- Muscles, Paralysis of. See Tumors of Brain.
- Muscles, Rigidity of. See Bromide of Ethyl—Catalepsy—Meningitis—Tremors; Paralysis Agitans.
- Muscles, Rigidity of Spinal. See Meningitis; Spinal.
- Muscles, Spasm of. See Tumors of Brain.
- Muscles, Spastic Condition of. See Meningitis.
- MUSCLES, SURGICAL DISEASES OF (*General Subject*).
- Muscles, Syphilitic Contraction of. See Muscles; Contracture.
- Muscles, Tonic Contractions of. See Sulphur; Poisoning.
- Muscles, Twitchings of. See Twitchings, Muscular (Index).
- Muscles, Wasting of Hypothenar. See Spinal Cord; Amyotrophic Sclerosis.
- Muscles, Wasting of Interossei. See Spinal Cord; Amyotrophic Sclerosis.
- Muscles, Wasting of Thenar. See Spinal Cord; Amyotrophic Sclerosis.
- Mushroom, Amanita Muscaria. See Toxic Foods; Ptomaines.
- Mushroom Poisoning. See Toxic Foods.
- Mushrooms, Edible. See Toxic Foods; Edible Mushrooms.
- Mushrooms, Poisonous. See Cholera Morbus—Hæmoglobinuria—Toxic Foods; Poisonous Mushrooms.
- MUSK (*General Subject*).
- Mussel Poisoning. See Toxic Foods; Shell-fish Poisoning.
- MUSTARD (*General Subject*).
- Mustard Eruption. See Dermatitis Venenata.
- Mustard Plaster. See Mustard.
- Mutism. See Deaf-mutism—Insanity; Catalepsy.
- Mutton Poisoning. See Toxic Foods; Meat Poisoning.
- Myalgia. See Mentha—Rheumatism; Muscular—Salol.
- Myalgia, Traumatic. See Muscles; Surgical Diseases.
- Myasthenia. See Stomach, Diseases of; Dilatation.
- Myasthenia Pseudoparalytica. See Muscles, Diseases of.
- Mycoses, Surgical. See Surgical Mycoses (Index).
- Mycosis of the Brain. See Encephalitis; Acute Non-suppurative.
- Mycotic Diarrhœa. See Infants, Diarrhœal Diseases of.
- Mydriasis. See Atropine—Gelsemium—Homatropine—Hypnotism—Toxic Foods; Shell-fish Poisoning.
- Mydriasis, Atropine. See Physostigma; Ophthalmic Disorders.
- Mydriasis, Paralytic. See Physostigma; Ophthalmic Disorders.
- Mydriatic. See Atropine—Gelsemium—Homatropine.
- Myelitis. See Locomotor Ataxia—Meningitis; Spinal—Spinal Cord, Diseases of—Spinal Cord; Poliomyelitis—Spinal Cord; Primary Lateral Sclerosis—Spinal Cord; Syringomyelia—Spine, Diseases of; Tumors—Zinc; Poisoning.
- Myelitis of Anterior Horns. See Spinal Cord; Poliomyelitis.
- Myelitis, Transverse. See Spinal Cord; Landry's Paralysis—Toxic Foods; Grain Poisoning.
- Myelogenous Leukæmia. See Leukæmia.
- Myeloid Sarcoma. See Tumors; Connective Tissue.
- Myelolymphatic Leukæmia. See Leukæmia.
- Myelomata. See Tumors; Connective-Tissue Tumors.
- Myocardial Debility. See Vasculo-Cardiac Neuroses; Irregular Heart.
- MYOCARDITIS (*General Subject*).
- Myocarditis, Interstitial. See Hypertrophy of Heart.
- Myofibroma. See Tumors.
- Myoma. See Tumors.
- Myoma, Intestinal. See Intestines; Tumors.

- Myoma of Fallopian Tube. See Uterine Adnexa; Tumors of Fallopian Tube.
- Myoma of Intestine. See Intestines; Tumors.
- Myoma, Uterine. See Uterine Myoma (Index).
- Myopathic Dislocations. See Dislocations.
- MYOPIA (*General Subject*). See Astigmatism — Atropine—Lens; Anomalies of Position.
- Myosis. See Arecoline.
- Myosis, Spinal. See Locomotor Ataxia.
- Myositis. See Parasites; Trichina.
- Myositis, Infectious. See Muscles, Diseases of.
- Myositis Ossificans. See Muscles; Ossifying Myositis—Tumors; Osteomata.
- Myositis, Progressive Ossifying. See Muscles.
- Myotic. See Arecoline—Jaborandi—Physostigma.
- Myotonia Congenita. See Muscles, Diseases of.
- Myringo-dermatitis. See Middle Ear; Acute Otitis.
- Mytilotoxin. See Toxic Foods; Shell-fish Poisoning.
- Myxochondromata. See Tumors; Myxomata.
- MYXEDEMA (*General Subject*). See Acromegaly—Animal Extracts; Thyroid—Elephantiasis—Exophthalmic Goitre—Muscles; Infectious Myositis—Scleroderma.
- Myxedema, Infantile. See Infantile Myxedema.
- Myxoma. See Liver; Tumors — Tumors; Connective-Tissue Tumors.
- Myxoma, Cutaneous. See Tumors; Connective Tissue.
- Myxoma, Intestinal. See Intestines; Tumors.
- Myxoma of Kidney. See Urinary System, Diseases of (Surgical); Tumors of Kidney.
- Myxoma of Maxillary Gland. See Salivary Glands; Tumors.
- Myxoma of Naso-pharynx. See Naso-pharynx; Tumors.
- Myxoma of Parotid Gland. See Salivary Glands; Tumors.
- Myxoma of Spinal Cord. See Spine, Diseases of; Tumors.
- Myxoma of Testicles. See Penis and Testicles; Tumors of Testicles.
- Myxoma of Tongue. See Tongue; Tumors.
- Myxomatous Lupus. See Tuberculosis of Skin; Lupus Vulgaris.
- Myxosarcoma. See Tumors; Myxomata.
- Nævi. See Encephalocele—Mercury; Nitrates—Phenic (Carbolic) Acid; Surgical Disorders—Potassium; Caustics—Tumors; Angiomata—Tumors; Connective Tissue.
- Nævi of Lips. See Mouth; Lips; Tumors.
- Nævus, Cavernous. See Tumors; Connective Tissue.
- Nævus of Scalp. See Wounds of Head; Tumors of Scalp.
- Nævus Verrucosus. See Surgical Diseases of the Skin and its Appendages; Verruæ.
- Nail-horns. See Tumors; Epithelial.
- Nails, Brittleness of. See Sulphur; Cutaneous Disorders.
- Nails, Contusion of. See Nails.
- NAILS, DISEASES AND INJURIES OF THE (*General Subject*).
- Nails, Diseases of. See Sulphur; Cutaneous Disorders.
- Nails, Hypertrophy of. See Nails.
- Nails, Syphilis of. See Syphilis; General Infection.
- Nails, Ulcerations of Root of. See Dermatitis Medicamentosa.
- Nails, White Spots on. See Sulphur; Cutaneous Disorders.
- Naphtha. See Petroleum—Pyridin.
- Naphthalene. See Naphthalin.
- NAPHTHALIN, NAPHTHOL, AND ALLIED COMPOUNDS (*General Subject*).
- Naphthalol. See Naphthalin; Salinaphthol — Salicylic Acid; Naphthol Salicylate.
- Naphthol. See Hæmoglobinuria—Naphthalin.
- Naphthoxol. See Hydrogen Dioxide.
- Naphtol. See Naphthalin.
- Narcaine. See Opium.
- Narcaine-sodium. See Salicylic Acid; Antispasmin.
- Narcosis. See Acetonuria.
- Narcosis, Opium. See Wounds of Head; Extradural Hæmorrhage.
- Narcotic. See Cajuput-oil—Camphor—Mace—Opium and Derivatives.
- Narcotic Poisoning. See Elaterium — Strychnine; Antidotal Uses.
- Narcotine. See Opium.
- Nasal Anæsthesia. See Erythroxyton Coca and Cocaine; Topical Administration.
- Nasal Bones, Fracture of. See Fracture.
- Nasal Carcinoma. See Nasal Cavities; Tumors.
- Nasal Cartilages, Necrosis of. See Syphilis; Congenital.
- Nasal Catarrh. See Erythroxyton Coca and Cocaine; Topical Administration — Phenacetin — Salicylic Acid; Aluminium Salicylate.
- Nasal Catarrh, Chronic. See Hydrastis; Catarrhal Disorders.
- NASAL CAVITIES, DISEASES OF (*General Subject*). See Pulmonary Circulation; Hæmorrhage.
- Nasal Cavities, Foreign Bodies in. See Respiratory Passages.
- Nasal Cavities, Tumors of. See Nasal Cavities.
- Nasal Diphtheria. See Diphtheria—Nasal Cavities; Croupous Rhinitis.
- Nasal Duct, Strictures of. See Resorcin; Resorcin-phthalein.
- Nasal Hæmorrhage. See Epistaxis (Index).
- Nasal Neuroses, Sensory. See Respiratory Organs.
- Nasal Obstruction. See Sinuses; Antrum—Sinuses; Ethmoiditis.
- Nasal Papillomata. See Nasal Cavities; Tumors.
- Nasal Polypi. See Asthma—Chronic Acid; Air-passages — Erythroxyton Coca and Cocaine; Nose; Pharynx — Nasal Cavities; Purulent Rhinitis — Nasal Cavities; Tumors — Tumors; Connective Tissue.
- Nasal Reflex Neuroses. See Respiratory Tract.
- Nasal Sarcoma. See Nasal Cavities; Tumors.
- Nasal Septum, Abscess of. See Nasal Cavities; Septum.
- Nasal Septum, Ulcers of. See Leprosy.
- Nasal Tamponing. See Epistaxis.
- Nasal Ulcers. See Leprosy—Paraldehyde.
- Naso-Ethmoidal Hernia. See Encephalocele.
- Naso-Frontal Hernia. See Encephalocele.
- Naso-Orbital Hernia. See Encephalocele.
- Naso-pharyngeal Tumors. See Naso-pharynx.
- Naso-pharyngitis. See Naso-pharynx.
- NASO-PHARYNX, DISEASES OF (*General Subject*). See Deaf-mutism.
- Naso-pharynx, Myxomata of. See Naso-pharynx; Tumors.
- Naso-pharynx, Sarcoma. See Naso-pharynx; Tumors.
- Naso-pharynx, Tumors of. See Naso-pharynx.
- Nasse's Law. See Hæmophilia.
- Nasturtium Eruption. See Dermatitis Venenata.
- Native Cinnabar. See Mercury.
- Natrium. See Sodium.
- Nauheim Baths. See Vascular System; Arteriosclerosis.
- Nauheim Treatment. See Fatty Heart—Myocarditis.
- Nausea. See Creasote; Gastro-Intestinal Disorders — Mentha—Mustard—Specific Infectious Fevers; Dengue — Sulphonal; Poisoning — Toxic Foods; Muscarine Poisoning — Zinc; Gastro-Intestinal Disorders.
- Navel, Swelling of. See Uterine Adnexa; Tumors of Ovaries.
- Nearthrosis. See Fractures.
- Nebula. See Cornea. Opacities of.
- Neck, Abscess of. See Middle Ear; Mastoiditis.
- Neck, Glandular Enlargement in. See Tumors of Larynx and Lungs; Carcinoma of Larynx.
- Neck, Injuries of. See Wounds and Injuries of Chest.
- Neck, Paralysis of. See Diphtheria.
- Neck, Stiffness of. See Tetanus.
- Necrosis. See Hydrogen Dioxide; Purulent Affections—Sulphur; Respiratory Disorders—Vascular System; Vascular Obstruction; Embolism.
- Necrosis of Bones. See Bone, Necrosis of (Index).
- Necrosis of Cornea. See Typhoid Fever.
- Necrosis of Cranial Bones. See Wounds of Head; Diseases Involving Skull.
- Necrosis of Jaw. See Jaws, Diseases of.
- Necrosis of Lower Jaw. See Phosphorus; Poisoning.
- Necrosis of Nasal Cartilages. See Syphilis; Congenital.
- Necrosis of Ribs. See Wounds and Injuries of Thorax; Secondary Complications.
- Necrosis of Sternum. See Wounds and Injuries of Thorax; Secondary Complications.
- Necrosis of Vertebrae. See Spine, Diseases of; Tuberculosis.

- Necrosis, Phosphorus. See Jaw.
 Nélaton's Line. See Fractures of Femur—Hip-joint Disease.
 Nematodes. See Parasites; Intestinal.
 Neoplasm, Rectal. See Tumors of Rectum and Anus; Malignant Growths.
 Neoplasms. See Mercury; Nitrates.
 Neoplasms, Autonomous. See Tumors.
 Neoplasms, Heterochronic. See Tumors.
 Neoplasms, Heterotopic. See Tumors.
 Neoplasms, Malignant. See Mercury; Nitrates—Tumors.
 Neoplasms of Nerves. See Nerves, Peripheral.
 Nephrectomy. See Abdomen; Contusion—Abdomen; Penetrating Wounds—Hydronephrosis—Urinary System, Diseases of (Surgical).
 Nephritic. See Kidney (Index)—Renal (Index).
 Nephritic Colic. See Colic, Renal (Index).
 Nephritis. See Albuminuria—Bright's Disease (Index)—Cerebral Hemorrhage—Cirrhosis of the Liver; Portal—Cirrhosis of the Liver; Secondary—Cystitis—Diabetes Insipidus—Diphtheria—Epistaxis—Ether; Contra-indications—Gold—Hydronephrosis—Hypertrophy of the Heart—Ichthyol; Miscellaneous Disorders—Infants, Diarrheal Diseases of—Influenza—Iron; Renal Diseases—Jaborandi—Jaundice; Acute Infectious—Juniper; Genito-Urinary Disorders—Laryngitis; (Edema—Linum—Malarial Fevers—Methylene-blue—Myxœdema—Nursing and Artificial Feeding; Nursing—Parotitis; Infectious—Pneumonia, Lobar—Rheumatism; Acute—Salicylic Acid; Theobromine and Lithium Salicylate—Salicylic Acid; Theobromine and Sodium Salicylate—Scarlet Fever—Spasms in Children; Tetany—Specific Infectious Fever; Terminal Infections—Turpentine—Typhoid Fever—Urinary System, Diseases of; Pyelitis—Vascular System; Arteriosclerosis.
 Nephritis, Desquamative. See Bright's Disease—Strontium; Genito-Urinary Disorders.
 Nephritis, Interstitial. See Bright's Disease—Strontium; Genito-Urinary Disorders.
 Nephritis, Pyæmic. See Wounds (Septic) and Gangrene; Pyæmia.
 Nephrolithotomy. See Urinary System, Diseases of (Surgical); Renal Calculus.
 Nephropexy. See Urinary System, Diseases of (Surgical); Movable Kidney.
 Nephroptosis. See Stomach, Diseases of; Gastropptosis.
 Nephrorrhaphy. See Hydronephrosis—Urinary System, Diseases of (Surgical); Movable Kidney.
 Nephrotomy. See Hydronephrosis—Urinary System, Diseases of (Surgical); General Surgery—Urinary System, Diseases of (Surgical); Nephrectomy.
 Nerve Extract. See Animal Extracts.
 Nerve, Paralysis of Sixth. See Pelletierine.
 Nerve, Paralysis of Third. See Pelletierine—Tumors of Brain; Tumors of Crus.
 Nerven Fieber. See Typhoid Fever.
 Nerve-palsies, Ocular. See Syphilis; Period of Sequela.
 Nerves, Anæmia of. See Nerves; Peripheral.
 Nerves, Compression of. See Nerves, Wounds and Injuries of.
 Nerves, Contusion of. See Nerves, Wounds and Injuries of.
 Nerves, Inflammation of Spinal. See Nerves; Peripheral.
 Nerves, Neoplasms of. See Nerves, Peripheral.
 Nerves, Palsy of Seventh Pair of. See Nerves, Wounds and Injuries of; Compression.
 NERVES, PERIPHERAL, DISEASES OF (*General Subject*).
 Nerves, Suture of. See Nerves, Wounds and Injuries of.
 Nerves, Tumors on. See Tumors; Connective Tissue.
 NERVES, WOUNDS AND INJURIES OF (*General Subject*).
 Nerve-sedative. See Sedative, Nerve (Index).
 Nerve-stimulant. See Stimulant, Nerve (Index).
 Nerve-stretching. See Leprosy—Nerves; Peripheral; Sciatica.
 Nerve-tonic. See Gold—Guarana.
 Nervine. See Alkaloids—Antipyrine—Cannabis Indica.
 Nervine Tonic. See Copper.
 Nervous Atony, Functional. See Strychnine; Nervous Disorders.
 Nervous Belching. See Stomach, Diseases of; Functional; Motor Neuroses.
 Nervous Cough. See Cough, Nervous (Index).
 Nervous Debility. See Phosphorus; Nervous Disorders.
 Nervous Disorders. See Silver—Strontium—Strychnine—Zinc.
 Nervous Dyspepsia. See Dyspepsia, Nervous (Index).
 Nervous Eructations. See Stomach, Diseases of; Functional Diseases.
 Nervous Exhaustion. See Uterus; Inversion.
 Nervous Headaches. See Zinc; Nervous Disorders.
 Nervous Irritability. See Syphilis; General Infection.
 Nervous Paralysis. See Sulphur; Respiratory Disorders.
 Nervous Prostration. See Phosphorus; Phosphates.
 Nervous Sedative. See Silver; Silver Chloride.
 Nervous Symptoms. See Toxic Foods; Grain Poisoning.
 Nervous System in Alcoholism. See Alcoholism, Chronic.
 Nervous Troubles, Ataxic. See Sulphonal; Poisoning.
 Nervous Vomiting. See Vomiting, Nervous (Index).
 Nervousness. See Valerian.
 Nettle-rash. See Rash, Nettle. (Index).
 Neural Cysts. See Tumors; Cysts.
 NEURALGIA (*General Subject*). See Acetanilid—Aconite—Aconitine—Ammonium—Anæsthesia—Aneurism—Anilipyrin—Antipyrine; Nervous Disorders—Arsenic—Atropine—Belladonna—Cajuput-oil—Camphor—Cannabis Indica—Chaulmugra-oil—Chloral; Mental Diseases—Cholelithiasis—Copper; Nervous Disorders—Diabetes Mellitus—Erythroxylon Coca and Cocaine; Hypodermic Administration—Ether; Therapeutics—Ethyl-chloride—Exalgin—Gelsemium—Glycosuria—Gout—Guaiacol; Painful Disorders—Hydracetin—Hyoscynamus—Hypnotism; Functional Disorders—Hysteria; Hypoæsthesia—Influenza—Iodine—Iodism—Iris; Iritis—Iron; Neuroses—Leukæmia—Malarial Fevers; Complication of Chronic Malarial Cachexia—Mentha—Menthol; Painful Disorders—Mercury; Chronic Poisoning—Methylene-blue—Mouth; Herpes Zoster—Nasopharynx; Chronic Naso-pharyngitis—Nerves, Peripheral—Nitroglycerin; Nervous Disorders—Orthoform—Palpebræ; Cutaneous Disorders—Phenacetin—Phenacetin; Lactophenia—Phenacetin; Methacetin—Phenacetin; Thymacetin—Phenocoll—Phosphorus; Nervous Disorders—Potassium; Osmate—Pregnancy. Disorders of—Quinine; Tonic—Rectum and Anus; Irritable Ulcer—Respiratory Tract; Nasal Reflex Neuroses—Rheumatism; Acute—Salicylic Acid—Salicylic Acid; Salicyl-paraphenetidin—Salicylic Acid; Tolipyrin Salicylate—Salol; Camphorated—Salophen—Strychnine; Nervous Disorders—Sulphur; Respiratory Disorders—Tension of Eyeball; Glaucoma—Thymol; Thymacetin—Typhoid Fever.
 Neuralgia, Costal. See Miliary Fever; Miliaris Alba.
 Neuralgia, Infra-orbital. See Strychnine; Nervous Disorders.
 Neuralgia, Intercostal. See Angina Pectoris—Endometritis—Neuralgia—Pleurisy; Acute—Pleurisy; Diaphragmatic.
 Neuralgia of Cheek. See Neuralgia—Sinuses; Ethmoiditis.
 Neuralgia of Eye. See Sinuses; Ethmoiditis.
 Neuralgia of Forehead. See Neuralgia—Sinuses; Ethmoiditis.
 Neuralgia, Ovarian. See Zinc; Nervous Disorders.
 Neuralgia, Pelvic. See Uterus; Sarcoma.
 Neuralgia, Rectal. See Locomotor Ataxia; Vesical; Rectal Symptoms.
 Neuralgia, Trifacial. See Neuralgia; Fifth Pair.
 Neuralgic Earache. See Atropine; Neuralgia.
 Neuralgic Headache. See Neuralgia; Migraine.
 Neuralgic Pains. See Tendons; Burstitis.
 Neuralgic Pains of Arms. See Tumors of Breast; Scirrhus Carcinoma.
 NEURASTHENIA (*General Subject*). See Animal Extracts; Brain—Animal Extracts; Orchitis—Animal Extracts; Suprarenal—Endometritis—Erythroxylon Coca and Cocaine; Nervous Disorders—Exophthalmic Goitre—Glycosuria—Hypnotism; Functional Disorders—Hysteria—Influ-

- Neurasthenia.
 enza—Intestines; Colitis; Mucous—Intestines; Enteroptosis—Leprosy—Middle Ear; Chronic Otitis—Phosphorus; Nervous Disorders—Quinine—Urinary System, Diseases of (Surgical); Movable Kidney—Uterus; Prolapse—Valvular Diseases of Heart; Aortic Regurgitation.
- Neurasthenia, Cerebral. See Insanity; General Paresis.
- Neurasthenia, Lithæmic. See Neuralgia.
- Neurasthenic Disorders. See Parasites; Intestinal; Ascari.
- Neuridin. See Toxic Foods; Ptomaines.
- Neurin. See Addison's Disease—Toxic Foods; Ptomaines.
- Neuritis. See Arsenic; Physiological Action—Cannabis Indica—Cerebral Hæmorrhage—Herpes Zoster—Influenza—Insanity; Acute Confusional—Iodine; Iodism—Methylene-blue—Nerves, Peripheral—Neuralgia—Pseudoleukæmia—Rheumatism; Chronic Articular—Rheumatism; Muscular—Salol—Strychnine; Nervous Disorders—Typhoid Fever.
- Neuritis, Alcoholic. See Alcoholic Neuritis (Index).
- Neuritis, Arsenical. See Nerves, Peripheral; Multiple Neuritis.
- Neuritis, Cardiac. See Bromides.
- Neuritis, Diphtheritic. See Nerves, Peripheral; Multiple Neuritis.
- Neuritis, Disseminated. See Nerves, Peripheral; Multiple Neuritis.
- Neuritis, Endemic. See Peripheral Nerves; Multiple Neuritis.
- Neuritis, Malarial. See Beriberi—Nerves, Peripheral; Multiple Neuritis.
- Neuritis, Monocular. See Optic Nerve and Retina.
- Neuritis, Multiple. See Arsenic; Physiological Action—Locomotor Ataxia—Neuritis; Puerperal—Parotitis; Infectious—Spinal Cord; Landry's Paralysis.
- Neuritis, Multiple Peripheral. See Beriberi.
- Neuritis of Spinal Accessory Nerve. See Nerves, Peripheral; Localized Neuritis.
- Neuritis, Optic. See Optic Neuritis (Index).
- Neuritis, Peripheral. See Malarial Fevers; Mental Disturbances—Pneumonia, Lobar—Pregnancy, Disorders of.
- Neuritis, Post-febrile. See Nerves, Peripheral; Multiple Neuritis.
- Neuritis, Puerperal. See Nerves, Peripheral; Multiple Neuritis.
- Neuritis, Retrobulbar Optic. See Optic Nerve and Retina.
- Neuritis, Saturnine. See Nerves, Peripheral; Multiple Neuritis.
- Neuritis, Scarlatinal. See Nerves, Peripheral; Multiple Neuritis.
- Neuritis, Septicæmic. See Nerves, Peripheral; Multiple Neuritis.
- Neuritis, Syphilitic. See Nerves, Peripheral; Multiple Neuritis.
- Neuritis, Tubercular. See Nerves, Peripheral; Multiple Neuritis.
- Neurofibroma. See Tumors; Connective Tissue.
- Neuroglial Tumors. See Tumors; Connective Tissue.
- Neuroglioma, Ganglionic. See Tumors; Gliomata.
- Neuroma. See Nerves, Peripheral; Neoplasms.
- Neuroma, Amputation. See Tumors; Neurofibroma.
- Neuroma, Plexiform. See Tumors; Connective Tissue—Tumors; Neurofibroma.
- Neuromyxomata. See Tumors; Connective Tissue.
- Neuropathic Arthritis. See Joints; Charcot's Disease.
- Neuropathic Keratitis. See Keratitis.
- Neuroses. See Ozone—Pneumonia, Lobar—Silver; Silver Chloride.
- Neuroses, Gastric. See Gastric Neuroses (Index).
- Neuroses, Occupation. See Nerves, Peripheral; Functional Disorders.
- Neuroses, Oesophageal. See Oesophagus.
- Neuroses of Eyelids. See Palpebræ, Diseases of.
- Neuroses of Spine. See Spine, Diseases of; Tuberculosis.
- Neuroses, Paræsthetic. See Nerves, Peripheral; Functional Disorders.
- Neuroses, Throat. See Menopause.
- Neuroses, Vasculo-Cardiac. See Vasculo-Cardiac Neuroses.
- Neutral Mixture. See Potassium; Anti-emetics.
- New Growths, Mediastinal. See Valvular Diseases of Heart; Aortic Stenosis.
- Night-blindness. See Optic Nerve and Retina; Retinitis.
- Night-palsy. See Nerves, Peripheral; Functional Disorders.
- Nightshade, Deadly-. See Atropine—Belladonna.
- Night-sweats. See Sulphonal—Surgical Diseases; Secondary Wound Fever.
- Night-sweats of Infants. See Osseous System; Rickets.
- Night-sweats of Phthisis. See Phthisis, Night-sweats of (Index).
- Night-terrors. See Naso-pharynx; Adenoid Growths.
- Nigua. See Wounds and Stings; Jigger.
- Nipples, Cracked. See Chloral—Erythroxylon Coca and Cocaine; Topical Administration—Ichthyol; Wounds—Orthoform.
- Nipples, Disorders of. See Mammary Gland—Nursing; Care of Nursing Woman.
- Nipples, Eczema of. See Mammary Gland.
- Nipples, Fissured. See Alcohol; Externally—Benzoin—Erythroxylon Coca; Topical Administration—Iron; Local Uses—Lead; External Application—Mammary Gland—Mammary Gland; Ulceration of Nipple—Picric Acid—Silver; Surgical Disorders.
- Nipples, Imperfectly Developed. See Mammary Gland.
- Nipples, Paget's Disease of. See Dermatitis Maligna.
- Nipples, Retracted. See Tumors of Breast; Encephaloid—Tumors of Breast; Scirrhus Carcinoma—Tumors of Breast; Tuberculosis.
- Nipples, Ulceration of. See Mammary Gland.
- Nirvanin. See Orthoform.
- NITRIC ACID (*General Subject*).
- Nitric-Acid Poisoning. See Nitric Acid.
- Nitric-Acid Test. See Albuminuria.
- NITRITES (*General Subject*).
- Nitrites Poisoning. See Nitrites.
- NITROBENZENE (*General Subject*).
- Nitrobenzene Poisoning. See Nitrobenzene.
- Nitrobenzol. See Hamoglobinuria—Nitrobenzene.
- Nitrobenzol Poisoning. See Glycosuria.
- Nitrocyanide Test. See Acetonuria.
- Nitrogen Monoxide. See Nitrous Oxide.
- Nitrogenous Bases. See Toxic Foods; Ptomaines.
- NITROGLYCERIN (*General Subject*). See Bright's Disease; Chronic—Pneumonia, Lobar.
- Nitroglycerin Poisoning. See Nitroglycerin.
- Nitrohydrochloric Acid. See Nitric Acid.
- Nitrophenic Acid. See Picric Acid.
- Nitrous Ether. See Nitrites.
- NITROUS OXIDE (*General Subject*). See Ether—Oxygen.
- Nitrous Oxide, Oxygenated. See Oxygen.
- Nitrozanthanic Acid. See Picric Acid.
- Nocturnal Cramps. See Sulphonal.
- Nodding Spasm. See Chorea; Anomalous Varieties.
- Nodes, Singers'. See Tumors of Larynx and Lungs; Larynx.
- Nodosities. See Leprosy.
- Noma. See Mercury; Nitrates—Mouth; Gangrenous Stomatitis.
- Non-diphtheritic Laryngitis. See Diphtheria; Laryngeal.
- Non-obstructive Jaundice. See Jaundice; Toxæmia.
- "Normal Salt Solution." See Sodium; Gastro-Intestinal Disorders.
- Normoblasts. See Anæmia, Pernicious.
- Nose, Diseases of. See Deaf-mutism—Nasal Cavities—Naso-pharynx.
- Nose, Fætid Discharge from. See Wounds of Head; Diseases Involving Skull.
- Nose, Foreign Body in. See Nasal Cavities; Purulent Rhinitis.
- Nose, Hæmorrhage from. See Epistaxis (Index).
- Nose, Plastic Operations upon. See Plastic Surgery; Rhinoplasty.
- Nose, Pus from. See Sinuses; Antrum—Sinuses; Ethmoiditis—Sinuses; Sphenoidal.
- Nose, Saddle-. See Leprosy.
- Nose-bleed. See Epistaxis (Index).
- Nové-Josseland's Operation. See Urinary System, Surgical Diseases of; Hypospadias.
- Nucleinic Acid. See Anthrax—Nucleins.
- NUCLEINS (*General Subject*).
- Nucleo-albumin. See Albuminuria—Animal Extracts; Thyroid—Nucleins.

- Numbness. See Hysteria; Paræsthesia — Vascular Diseases of Brain; Thrombosis.
- Numbness in Legs. See Spinal Cord; Landry's Paralysis.
- Numbness of Extremities. See Locomotor Ataxia.
- Numbness, Waking. See Nerves, Peripheral; Functional Disorders.
- NURSING AND ARTIFICIAL FEEDING (*General Subject*).
- Nursing Women, Anæmia of. See Phosphorus; Phosphates.
- Nutmeg. See Mace.
- Nutmeg Liver. See Liver, Nutmeg (Index).
- Nutrient. See Olive-oil.
- Nutritive Enemata. See Enemata, Nutritive (Index).
- NUX VOMICA (*General Subject*). See Strychnine.
- Nux-Vomica Poisoning. See Nux Vomica.
- Nymphomania. See Camphor; General Maladies—Digitalis; Anaphrodisiac.
- Nystagmus. See Sclerosis of Brain — Spasms in Children; Automatic Movements — Spasms in Children; Tetany — Spinal Cord; Hereditary Ataxia.
- Obermayer's Test. See Indicanuria.
- Obermeier's Spirocheta. See Specific Infectious Fevers; Relapsing.
- Obesity. See Adonis — Animal Extracts; Thyroid; Obesity — Fatty Heart and Obesity—Gout—Uterine Adnexa; Tumors of Ovaries.
- Obi. See Curara.
- Obiah. See Curara.
- Observations, Visual. See Vascular Diseases of Brain; Thrombosis.
- "Obsessions." See Insanity; Morbid Impulses.
- OBSTRUCTION, INTESTINAL (*General Subject*). See Intestinal Obstruction (Index).
- Obstruction, Nasal. See Nasal Obstruction (Index).
- Obstruction of Brain-arteries. See Vascular Diseases of Brain; Arteries.
- Obstruction, Pyloric. See Pyloric Obstruction (Index).
- Obstruction, Vascular. See Vascular System; Vascular Obstruction.
- Obstructive Jaundice. See Jaundice.
- Obturator Hernia. See Hernia; Rare Forms.
- Occipital Headache. See Spine, Diseases of; Tuberculosis.
- Occipital Hernia. See Encephalocele.
- Occipital Lobe, Tumors of. See Tumors of Brain.
- Occiput, Dislocations of. See Dislocations.
- Occupation Deafness. See Internal Ear.
- Occupation Neurosis. See Nerves, Peripheral; Functional Disorders.
- Ochre-colored Stools. See Typhoid Fever.
- Ocular Affections. See Muscles; Torticollis.
- Ocular-Muscle Palsies. See Locomotor Ataxia.
- Ocular Muscles, Advancement of. See Strabismus.
- Ocular Muscles, Paralysis of. See Locomotor Ataxia; Ocular-Muscle Palsies — Meningitis; Acute Leptomenigitis—Meningitis; Cerebral.
- Ocular Muscles, Spasm of. See Encephalitis; Acute Non-suppurative.
- Ocular-Nerve Palsies. See Syphilis; Period of Sequelæ.
- Ocular Tension in Childhood, Increased. See Tension of Eyeball; Glaucoma.
- Oculomotor Palsy. See Encephalitis; Acute Diffuse Suppurative.
- Oculomotor Paralysis. See Cerebral Hæmorrhage; Paralysis—Strabismus—Typhoid Fever.
- Odontalgia. See Hypnotism; Functional Disorders.
- Odontomata. See Tumors; Connective Tissue.
- O'Dwyer's Instruments. See Intubation.
- Œdema. See Aneurism—Bright's Disease—Cerebral Hæmorrhage—Diabetes Mellitus—Dilatation of the Heart—Diphtheria—Elephantiasis—Exophthalmic Goitre—Fatty Heart—Fractures—Infantile Myxœdema—Juniper; Genito-Urinary Disorders—Leukæmia—Magnesia—Measles—Muscles; Infectious Myositis — Muscles; Polymyositis — Myxœdema—Nerves, Peripheral; Multiple Neuritis — Paraldehyde—Parasites; Trichina—Potassium; Diuretics — Pseudoleukæmia — Salicylic Acid; Poisoning—Scarlet Fever—Scleroderma—Spinal Cord; Syringomyelia — Status Lymphaticus; Lymphangiectasis — Tracheo-Laryngeal Operations; Tracheotomy—Uterine Adnexa; Tumors of Ovaries — Valvular Diseases of Heart; Mitral Regurgitation—Vascular System; Phlebitis—Vascular System; Phlegmasia Alba Dolens — Vascular System; Varix — Vascular System; Vascular Obstruction; Thrombosis.
- Œdema, Cardiac. See Mercury; Chlorides.
- Œdema, Laryngeal. See Laryngeal Œdema (Index).
- Œdema, Malignant. See Surgical Diseases.
- Œdema of Ankles. See Ankles, Œdema of (Index)—Scorbutus—Stomach, Diseases of; Carcinoma—Vascular System; Phlegmasia Alba Dolens.
- Œdema of Arm. See Arm, Œdema of (Index).
- Œdema of Brain. See Magnesia.
- Œdema of Chest. See Pleurisy; Acute.
- Œdema of Epiglottitis. See Ichthyol; Miscellaneous Disorders.
- Œdema of Extremities. See Beriberi — Locomotor Ataxia—Miliary Fever.
- Œdema of Eyelids. See Eyelids, Œdema of (Index).
- Œdema of Feet. See Feet, Œdema of (Index).
- Œdema of Glottis. See Glottis, Œdema of (Index).
- Œdema of Larynx. See Larynx, Œdema of (Index).
- Œdema of Legs. See Uterine Adnexa; Tumors of Ovaries.
- Œdema of Limb. See Status Lymphaticus, Lymphangitis.
- Œdema of Lungs. See Lung, Œdema of (Index).
- Œdema of Scalp. See Wounds of Head; Abscess of Scalp.
- Œdema of Throat. See Parotitis; Infectious.
- Œdema of Wrist. See Scorbutus.
- Œdema, Pulmonary. See Pulmonary Œdema (Index).
- Œdema, Traumatic Cerebral. See Wounds of Head; Wounds of Brain.
- Œdema with Bluish Discoloration. See Hysteria.
- Œdematous Swelling. See Wounds and Injuries of Thorax; Subcutaneous Emphysema.
- Oertel's Method of Treatment. See Dilatation of the Heart.
- Oertel's System of Dietary. See Fatty Heart and Obesity.
- Œsophageal Carcinoma. See Œsophagus; Stricture — Œsophagus; Tumors.
- Œsophageal Dilatation. See Œsophagus.
- Œsophageal Hæmorrhage. See Cirrhosis of the Liver; Portal.
- Œsophageal Injuries. See Œsophagus.
- Œsophageal Paralysis. See Hysteria; Motor Symptoms.
- Œsophageal Spasms. See Œsophagus; Neuroses.
- Œsophageal Stricture. See Œsophagus—Œsophagus, Stricture of (Index)—Pancreatin; Surgical Solvent.
- Œsophageal Stricture, Spasmodic. See Silver; Surgical Disorders.
- Œsophagismus. See Œsophagus; Neuroses.
- Œsophagitis. See Œsophagus.
- Œsophagotomy. See Œsophagus; Stricture.
- Œsophagus, Abscess in. See Œsophagus; Foreign Bodies.
- Œsophagus, Cicatricial Contraction of. See Stomach, Surgery of; Gastrostomy.
- Œsophagus, Congenital Closure of. See Stomach, Surgery of; Gastrostomy.
- ŒSOPHAGUS, DISEASES OF THE (*General Subject*).
- Œsophagus, Diverticulum of. See Stomach, Surgery of; Gastrostomy.
- Œsophagus, Foreign Bodies in. See Wounds and Injuries of Thorax; Posterior Thoracotomy.
- Œsophagus, Paralysis of. See Hysteria; Motor Symptoms.
- Œsophagus, Stricture of. See Œsophageal Stricture (Index) — Stomach; Surgery of; Gastrostomy — Stomach, Diseases of; Toxic Gastritis.
- Œsophagus, Syphilitic Stricture of. See Stomach, Surgery of; Gastrostomy.
- Œsophagus, Tubage of. See Œsophagus; Stricture.
- Œsophagus, Varicose Veins of. See Cirrhosis of the Liver; Portal.
- Oidium Albicans. See Vagina; Non-cystic Growths.
- Oil Enemata. See Constipation.
- Oil of Cade. See Juniper.
- Oil of Origanum. See Thymol.
- Oil of Santal. See Sandal-wood.
- Oil of Thyme. See Thymol.
- Oil-cake. See Linum.
- Oligochromæmia. See Anæmia, Pernicious—Pseudo-leukæmia.

- Oligocythæmia. See Anæmia, Pernicious—Pseudo-leukæmia.
- OLIVE-OIL (*General Subject*). See Cholelithiasis.
- Olive-oil Ememata. See Constipation.
- Omental Tumor. See Peritoneum; Chronic Peritonitis—Urinary System, Diseases of (Surgical); Movable Kidney.
- Omentum, Indurated Puckered. See Liver; Tumors.
- Onanism. See Hypnotism; Vicious Habits.
- One-Horned Uterus. See Uterus; Malformations.
- Onomatomania. See Insanity; Morbid Impulses.
- Onychia. See Lead; External Application—Locomotor Ataxia; Trophic Symptoms—Nails.
- Onychia Maligna. See Chronic Acid; Morbid Growths—Mercury; Chlorides.
- Onychia, Malignant. See Nails, Diseases of.
- Onychia Parasitica. See Chronic Acid; Morbid Growths.
- Onychia, Syphilitic. See Syphilis; General Infection.
- Oöphorectomy. See Animal Extracts; Ovarian.
- Oöphoritis. See Metritis—Uterine Adnexa; Inflammations of Ovary.
- Opacities of Cornea. See Cornea.
- Opacities of Vitreous Humor. See Jaborandi; Ophthalmic Disorders.
- Operation, Alexander's. See Uterus; Prolapse—Uterus; Retroflexion.
- Operation, Emmet's. See Emmet's Operation (Index).
- Operation, Flap-splitting. See Vagino-Perineal Injuries.
- Operation, Galabius. See Vagino-Perineal Injuries.
- Operation, Hegar's. See Vagina; Prolapse.
- Operation, Kraskes's. See Tumors of Rectum and Anus; Malignant Growths.
- Operation, Schroeder's. See Uterus; Laceration of Cervix.
- Operation, Tait's. See Vagino-Perineal Injuries; Flap-splitting Operation.
- Ophthalmia. See Specific Infectious Fevers; Dengue—Strontium; Constitutional Disorders.
- Ophthalmia, Catarrho-Rheumatic. See Conjunctiva; Catarrhal Conjunctivitis.
- Ophthalmia, Egyptian. See Conjunctiva; Granular Conjunctivitis.
- Ophthalmia Gonorrhæal. See Argonin—Conjunctiva; Gonorrhæal Ophthalmia—Conjunctiva; Ophthalmia Neonatorum—Silver; Ophthalmic Disorders.
- Ophthalmia Neonatorum. See Boracic Acid—Conjunctiva—Conjunctivitis; Croupous—Cornea; Tumors—Silver; Ophthalmic Disorders—Silver; Protargol.
- Ophthalmia, Purulent. See Copper; Eye Diseases—Manganese; External Uses—Silver; Ophthalmic Disorders—Silver; Argonin.
- Ophthalmic Disorders. See Silver.
- Ophthalmic Veins, Thrombosis of. See Typhoid Fever.
- Ophthalmomalacia. See Tension of Eyeball; Diminished.
- Ophthalmoplegia. See Encephalitis; Acute Non-suppurative—Tumors of Brain; Tumors of Base—Tumors of Brain; Tumors of Corpora Quadrigemina.
- Ophthalmoplegia Externa. See Strabismus.
- Opioniac. See Morphinomania.
- Opisthotonos. See Eclampsia—Encephalitis; Acute Non-suppurative—Ergot; Chronic Poisoning—Rheumatism; Muscular Spasms in Children; Tetany—Strychnine; Poisoning.
- Opisthotonos, Cervical. See Meningitis; Chronic Cerebral.
- OPIUM (*General Subject*). See Appendicitis—Cataplexy—Diabetes Mellitus—Insanity; Acute Conical—Insanity; Melancholia—Insanity; Post-operative—Nursing; Breast-milk.
- Opium Eruption. See Dermatitis Medicamentosa—Erythema Scarlatiniforme.
- Opium Habit. See Amylene-hydrate—Erythroxyton Coca and Cocaine; Internal Administration—Lupulus; Sedative—Morphinomania.
- Opium Narcosis. See Wounds of Head; Extradural Hemorrhage.
- Opium Poisoning. See Alcoholism; Acute—Atropine; Antidotal Uses—Coffee—Nitroglycerin; Antidotal Uses—Strychnine; Antidotal Uses.
- Opium-inebriates. See Morphinomania.
- Opium-inebriety. See Morphinomania.
- Oppler-Boas Bacillus. See Stomach, Diseases of; Carcinoma—Stomach, Diseases of; Dilatation.
- Optic Atrophy. See Locomotor Ataxia; Optic Atrophy—Optic Nerve and Retina; Optic Atrophy—Sclerosis of Brain—Toxic Amblyopia.
- Optic Disk, Cupping of. See Tension of Eyeball; Glaucoma.
- OPTIC NERVE AND RETINA, DISEASES OF THE (*General Subject*).
- Optic-Nerve Atrophy. See Tumors of Brain—Typhoid Fever.
- Optic Nerve, Tumors of. See Optic Nerve and Retina—Orbit; Tumors.
- Optic Neuritis. See Acetanilid; Neuralgia—Locomotor Ataxia; Optic Atrophy—Meningitis; Cerebral—Optic Nerve and Retina; Optic Neuritis—Typhoid Fever.
- Optic Neuritis, Double. See Tumors of Brain—Typhoid Fever.
- Optic Neuritis, Idiopathic. See Jaborandi; Ophthalmic Disorders.
- Optic Papillitis. See Optic Nerve and Retina; Optic Neuritis.
- Orbicularis Muscle, Twitching of. See Physostigma; Spasmodic Disorders.
- ORBIT, DISEASES OF THE (*General Subject*).
- Orbit, Puffiness about. See Vascular Diseases of Brain; Thrombosis of Sinuses.
- Orbit, Tumors of. See Orbit.
- Orbital Carcinoma. See Orbit; Tumors.
- Orbital Cellulitis. See Orbit.
- Orbital Hemorrhage. See Typhoid Fever.
- Orbital Osteoma. See Orbit; Miscellaneous Diseases.
- Orbital Sarcomata. See Orbit; Tumors.
- Orbital Tumors. See Orbit.
- Orbital Veins, Thrombosis of. See Typhoid Fever.
- Orbital Walls, Caries of. See Orbit; Miscellaneous Diseases.
- Orbits, Hemorrhage into. See Abdomen; Contusion.
- Orchidopexy. See Penis and Testicles; Undescended Testicle.
- Orchitic Extract. See Animal Extracts.
- Orchitis. See Guaiacol; Painful Disorders—Hernia; Inguinal—Parotitis; Infectious—Mercury; Metallic—Penis and Testicles; Orchitis—Penis and Testicles; Torsion of Testicles—Rheumatism; Acute—Silver; Venereal Disorders—Specific Infectious Fevers; Relapsing.
- Orchitis, Syphilitic. See Penis and Testicles; Orchitis.
- Orchitis, Tubercular. See Penis and Testicles; Orchitis.
- Organic Extracts. See Animal Extracts.
- Organum, Oil of. See Thymol.
- Orrhoselenitis. See Status Lymphaticus; Lymphangitis.
- Ortho-di-oxy-benzene. See Resorcin; Pyrocatechin.
- ORTHOFORM (*General Subject*). See Mammary Gland; Nipples—Tuberculosis of Larynx—Tumors of Larynx and Lungs; Carcinoma of Larynx.
- Ortho-oxbenzaldehyde. See Salicylic Acid; Salicylic Aldehyde.
- Ortho-ox-benzoic Acid. See Salicylic Acid.
- Orthopædic Deformities. See Naso-pharynx; Adenoids.
- ORTHOPEDIC SURGERY (*General Subject*).
- Orthophoria. See Strabismus; Latent.
- Orthophosphoric Acid. See Phosphoric Acid.
- Orthopnea. See Dilatation of the Heart—Tumors of Larynx and Lungs; Larynx—Valvular Diseases of Heart; Mitral Stenosis—Valvular Diseases of Heart; Tricuspid Regurgitation.
- Orthoptic Exercises. See Strabismus.
- Oscillatory Spasm. See Chorea; Anomalous Varieties.
- Osseous Deformities. See Animal Extracts; Bone-marrow.
- Osseous Leukæmia. See Leukæmia; Lymphatic.
- OSSEOUS SYSTEM, DISEASES OF THE (*General Subject*).
- Osseous Tumors. See Tumors; Connective Tissue.
- Ossiculectomy. See Middle Ear; Ossiculectomy.
- Ossification of Choroid. See Iris, Ciliary Body, and Choroid.
- Ossification of Muscle. See Muscles, Ossification of (Index).
- Ossified Man. See Muscles; Ossifying Myositis.
- Osteitis. See Scorbutus, Infantile.
- Osteitis Deformans. See Acromegaly.

- Osteoarthritis. See Joints, Loose Bodies in—Joints, Surgical Diseases of; Varieties.
- Osteoarthropathy, Pulmonary. See Acromegaly.
- Osteochondroma. See Tumors—Tumors; Osteomata.
- Osteochondrosarcoma. See Tumors; Osteomata.
- Osteoclasia. See Orthopedic Surgery; Bow-legs.
- Osteocopic Pains. See Syphilis; Infectious Secretions.
- Osteofibroma. See Tumors; Osteomata.
- Osteoma. See Tendons; Ganglion—Tumors—Tumors; Odontomata—Tumors; Osteomata.
- Osteoma of Lung. See Tumors of Larynx and Lungs; Lungs.
- Osteoma of Pharynx. See Tonsils; Tumors.
- Osteoma of Spinal Cord. See Spine, Diseases of; Tumors.
- Osteoma, Orbital. See Orbit; Miscellaneous Diseases.
- Osteoma, Parosteal. See Tumors; Connective Tissue—Tumors; Osteomata.
- Ostomalacia. See Animal Extracts; Bone-marrow—Insanity—Osseous System—Phosphorus; Osseous Disorders.
- Osteomyelitis. See Osseous System—Rheumatism; Gonorrhœal—Silver; Unguentum Crédé.
- Osteomyelitis, Multiple. See Spine, Diseases of; Tuberculosis.
- Osteophytes. See Tumors; Connective Tissue—Tumors; Osteomata.
- Osteosarcoma. See Aneurism; Popliteal—Tumors; Osteomata.
- Osteosclerosis. See Osseous System; Ostitis.
- Osteotomy. See Fractures—Orthopedic Surgery.
- Ostitis. See Osseous System.
- Ostitis Deformans. See Osseous System; Ostitis.
- Ostitis of Cranial Bones. See Wounds of Head; Diseases Involving Skull.
- Ostitis Typhosa. See Typhoid Fever.
- Otalgia. See Earache (Index)—Influenza—Middle Ear; Acute Otitis.
- Othammatoma. See Insanity.
- Otitis, Syphilitic Germinal Cell of. See Syphilis.
- Otitis Media. See Diabetes Mellitus—Diphtheria—Formaldehyde; Respiratory Tract—Influenza—Measles—Menthol; Ear Diseases—Middle Ear—Phenic (Carbolic) Acid; Diaphtherin—Potassium; Sozoiodolate—Rheumatism; Acute—Scarlet Fever.
- Otitis Media, Purulent. See Phenic (Carbolic) Acid; Chlorphenol—Resorcin.
- Otitis Media, Suppurative. See Salol; Camphorated—Aristol; Diseases of Ear.
- Otomycosis. See External Ear.
- Otorrhœa. See Boracic Acid—Middle Ear; Chronic Purulent—Naso-pharynx; Adenoids.
- Otorrhœa, Fœtid. See Creasote; Ulcerations.
- Otorrhœa, Scrofulous. See Strontium; Constitutional Disorders.
- Ourali. See Curara.
- Ouari. See Curara.
- Ova in Stools. See Parasites; Intestinal.
- Ovarian Congestion. See Uterine Adnexa; Acquired Malformations of Ovaries.
- Ovarian Cysts. See Cysts, Ovarian (Index)—Hydro-nephrosis—Peritoneum; Ascites—Peritoneum; Tuberculous Peritonitis—Uterine Adnexa; Tumors of Ovaries.
- Ovarian Dermoids. See Tumors; Dermoids.
- Ovarian Extract. See Amenorrhœa—Animal Extracts—Menopause.
- Ovarian Hernia. See Uterine Adnexa; Displacements of Ovaries.
- Ovarian Hyperplasia. See Uterus; Myoma.
- Ovarian Neuralgia. See Zinc; Nervous Disorders.
- Ovarian Papilloma. See Uterine Adnexa; Tumors of Ovaries.
- Ovarian Torpor. See Gold; Gynecological Disorders.
- Ovarian Tumors. See Pleurisy; Acute—Pregnancy, Disorders of—Spleen; Wandering—Uterine Adnexa—Uterine Adnexa; Tumors of Ovaries.
- Ovarian Tumors, Cystic. See Uterine Adnexa; Tumors of Ovaries.
- Ovarin. See Animal Extracts; Ovarian.
- Ovariectomy. See Pregnancy, Disorders of—Uterine Adnexa; Tumors of Ovaries.
- Ovary, Carcinoma of. See Uterine Adnexa; Tumors of Ovaries.
- Ovary, Cirrhosis of. See Uterine Adnexa; Inflammations of Ovary.
- Ovary, Congestion of. See Uterine Adnexa; Acquired Malformations of Ovaries.
- Ovary, Cystic. See Uterine Adnexa; Inflammations of Ovary—Uterine Adnexa; Tumors of Ovaries.
- Ovary, Cysts of. See Ovarian Cysts (Index)—Uterine Adnexa; Inflammations of Ovary.
- Ovary, Dermoid Cysts of. See Uterine Adnexa; Tumors of Ovaries.
- Ovary, Displacements of. See Uterine Adnexa.
- Ovary, Fibromyoma of. See Uterine Adnexa; Tumors of Ovaries.
- Ovary, Fibrosarcoma of. See Uterine Adnexa; Tumors of Ovaries.
- Ovary, Follicular Cysts of. See Uterine Adnexa; Tumors of Ovaries.
- Ovary, Hyperæmia of. See Uterine Adnexa; Acquired Malformations of Ovaries.
- Ovary, Inflammation of. See Ichthyol; Gynecological Disorders—Parotitis—Uterine Adnexa; Inflammations of Ovary—Uterine Adnexa.
- Ovary, Prolapse of. See Uterine Adnexa; Displacements of Ovary.
- Ovary, Removal of. See Animal Extracts; Ovarian—Pulmonary Circulation; Hæmorrhage.
- Ovary, Sarcoma of. See Uterine Adnexa; Tumors of Fallopian Tubes—Uterine Adnexa; Tumors of Ovaries.
- Ovary, Teratoma of. See Uterine Adnexa; Tumors of Ovaries.
- Ovary, Transplantation of. See Animal Extracts; Ovarian.
- Ovary, Tumors of. See Ovarian Tumors (Index)—Uterine Adnexa; Tumors of Ovaries.
- Oxalate of Cerium. See Locomotor Ataxia—Oxalic Acid.
- OXALIC ACID (*General Subject*).
- Oxalic-Acid Poisoning. See Oxalic Acid.
- OXALURIA (*General Subject*). See Neurasthenia—Nitric Acid—Zinc; Gastro-Intestinal Disorders.
- OX-GALL (*General Subject*).
- Oxide of Ethyl. See Ether.
- Oxybutyric Acid in Urine. See Diabetes Mellitus.
- Oxy-ethyl-acetanilid. See Phenacetin.
- OXYGEN (*General Subject*). See Dilatation of the Heart—Ozone.
- Oxygen and Nitrous Oxide. See Nitrous Oxide.
- Oxygen Inhalation. See Cocainomania—Ether—Pertussis—Pneumonia, Catarrhal—Pneumonia, Lobar—Pulmonary Emphysema; Vesicular.
- Oxygenated Ether. See Oxygen.
- Oxygenated Nitrous Oxide. See Oxygen.
- Oxygenated Water. See Hydrogen Dioxide.
- Oxygen-water. See Oxygen.
- Oxymel Cupri Subacetis. See Copper.
- Oxy-methylene. See Formaldehyde.
- Oxyquinaseptol. See Phenic (Carbolic) Acid; Diaphtherin.
- Oxytoxic. See Cannabis Indica—Cinnamon—Corn-ergot and Corn-silk—Cotton-plant—Ergot—Hydrastis—Quinine.
- Oxytolutic Acid. See Creasote.
- Oxyuria. See Sodium, Gastro-Intestinal Disorders.
- Oxyuris Vermicularis. See Naphthalin; Anthelmintic—Parasites; Intestinal—Rectum and Anus; Pruritus Ani—Salicylic Acid—Thymol.
- Oyster Poisoning. See Toxic Foods; Shell-fish Poisoning.
- Oyster, Toxic. See Toxic Foods; Ptomaines.
- Oyster-shuckers' Keratitis. See Keratitis.
- Ozæna. See Alumnol; Laryngology—Chromic Acid; Antiseptic—Erythroxyton Coea and Cocaine; Nose—Europen; Nasal Disorders—Hydrogen Dioxide; Aural Disorders—Internal Ear; Ménière's Disease—Iodine; Aristol—Manganese; External Uses—Naphthalin; Naphthol-camphor—Nasal Cavities; Atrophic Rhinitis—Naso-pharynx; Chronic Naso-pharyngitis—Ozone—Phenic (Carbolic) Acid; Chlorphenol—Pix Liquida; Respiratory Tract—Potassium; Sozoiodolate—Salicylic Acid—Salicylic Acid; Aluminium Salicylate—Salol—Strontium; Constitutional Disorders—Syphilis; Congenital.
- Ozæna, Laryngeal. See Laryngitis; Chronic.
- Ozæna, Specific. See Creasote; Venereal Diseases.
- OZONE (*General Subject*). See Oxygen.
- Pachymeningitis. See Meningitis—Spinal Cord; Syringomyelia.
- Pachymeningitis, Cervical. See Hypnotism; Organic Disease.

- Pachymeningitis, Chronic. See Cirrhosis of the Liver; Portal.
- Pachymeningitis, Hæmorrhagic Internal. See Meningitis.
- Pachymeningitis, Syphilitic Spinal. See Spinal Cord; Myelitis.
- Pachymeningitis, Tubercular Spinal. See Spinal Cord; Myelitis.
- Pack, Hot Wet. See Bright's Disease; Acute.
- Paget's Disease of Nipple. See Dermatitis Maligna.
- Pagoplexia. See Surgical Diseases of the Skin and its Appendages; Frost-bite.
- Painful Urination. See Sulphur; Poisoning.
- Pains of Arms, Neuralgic. See Tumors of Breast; Scirrhus Carcinoma.
- Painter's Colic. See Iodine—Lead; Chronic Poisoning; Colic.
- Palate, Cleft. See Plastic Surgery.
- Palate, Deformities of. See Plastic Surgery.
- Palate, Paralysis of. See Diphtheria.
- Palatine Hydronephalocele. See Encephalocele.
- Palmar Abscess. See Tendons; Tenosynovitis.
- Palms, Yellow. See Typhoid Fever.
- PALPBRÆ, DISEASES OF (*General Subject*). See Eyelids (Index).
- Palpitation of Heart. See Heart, Palpitation of (Index).
- Palsies. See Vascular System; Arteriosclerosis.
- Palsies, Birth-. See Spinal Cord; Poliomyelitis.
- Palsies, Cerebral. See Cerebral Palsies (Index).
- Palsies from Peripheral Neuritis. See Spinal Cord; Poliomyelitis.
- Palsies, Ocular Muscle. See Locomotor Ataxia; Ocular-Muscle Palsies.
- Palsy. See Mercury; Chronic Poisoning.
- Palsy, Acute Infantile. See Strychnine; Nervous Disorders.
- Palsy, Bell's. See Bell's Palsy (Index).
- Palsy, Night. See Nerves, Peripheral; Functional Disorders.
- Palsy, Oculomotor. See Encephalitis; Acute Diffuse Suppurative.
- Palsy of Seventh Pair of Nerves. See Nerves; Wounds and Injuries of; Compression.
- Palsy, Progressive Lead. See Strychnine; Nervous Disorders.
- Palsy, Recumbent. See Nerves, Peripheral; Functional Disorders.
- Paludal Fever. See Malarial Fevers; Synonyms.
- Paludism. See Malarial Fevers; Synonyms.
- Panama Fever. See Malarial Fevers; Synonyms.
- Panaris. See Tendons; Tenosynovitis.
- Pancreas, Adenoma of the. See Pancreas; Tumors.
- Pancreas, Cancer of. See Glycosuria—Pancreas; Tumors.
- Pancreas, Cysts of. See Pancreas—Peritoneum; Tuberculous Peritonitis—Suprarenal Capsules; Tumors.
- PANCREAS, DISEASES OF THE (*General Subject*).
- Pancreas, Extirpation of. See Glycosuria.
- Pancreas, Growths of. See Suprarenal Capsules; Tumors.
- Pancreas, Gumma of the. See Pancreas; Tumors.
- Pancreas in Alcoholism. See Alcoholism; Chronic.
- Pancreas, Lymphoma of the. See Pancreas; Tumors.
- Pancreas, Sarcoma of the. See Pancreas; Tumors.
- Pancreas, Tumors of. See Aneurism; Abdominal Aorta—Pancreas—Spleen; Wandering.
- Pancreatic Apoplexy. See Pancreas; Hæmorrhage.
- Pancreatic Calculi. See Pancreas.
- Pancreatic Diabetes. See Diabetes Mellitus.
- Pancreatic Extract. See Pancreatin.
- Pancreatic Hæmorrhage. See Pancreas.
- Pancreatic Tumors. See Pancreas, Tumors of (Index).
- PANCREATIN (*General Subject*).
- Pancrætitis. See Pancreas.
- Pancrætitis, Acute Hæmorrhagic. See Obstruction, Intestinal—Pancreas; Pancrætitis.
- Panhysterectomy. See Uterus; Myoma.
- Pannous Keratitis. See Keratitis.
- Pannus. See Conjunctiva; Granular Conjunctivitis—Jequiry—Keratitis; Pannous.
- Panophthalmia. See Plague.
- Panophthalmitis. See Iris; Iritis—Iris; Purulent Inflammation.
- Papaver Somniferum. See Opium.
- Papaverine. See Opium.
- Papillary Cystocarcinoma. See Uterine Adnexa; Tumors of Ovaries.
- Papillary Cystoma, Colloid. See Uterine Adnexa; Tumors of Ovaries.
- Papillitis, Lingual. See Tongue.
- Papillitis, Optic. See Optic Nerve and Retina; Optic Neuritis.
- Papilloma. See Tumors—Tumors; Fibromata.
- Papilloma, Intestinal. See Intestines; Tumors.
- Papilloma, Nasal. See Nasal Cavities; Tumors.
- Papilloma Neuroticum. See Surgical Diseases of the Skin and its Appendages; Verrucae.
- Papilloma of Conjunctiva. See Conjunctiva; Tumors.
- Papilloma of Eyelids. See Palpebræ; Tumors.
- Papilloma of Fallopian Tube. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Papilloma of Intestine. See Intestines; Tumors.
- Papilloma of Larynx. See Tumors of Larynx and Lungs; Larynx.
- Papilloma of Penis. See Penis and Testicles; Tumors.
- Papilloma of Pharynx. See Tonsils; Tumors.
- Papilloma of Rectum. See Tumors of Rectum and Anus; Benign.
- Papilloma of Rectum, Granular. See Tumors of Rectum and Anus; Papillomata.
- Papilloma of Tongue. See Tongue; Tumors.
- Papilloma, Ovarian. See Uterine Adnexa; Tumors of Ovaries.
- Papilloma, Villous. See Tumors; Epithelial.
- Papillomatous Growths. See Syphilis.
- Papoid. See Bright's Disease; Chronic.
- Papular Eruption. See Dermatitis Exfoliativa; Epidemic—Eczema—Eruption, Papular (Index)—Erythema Chloaricum—Erythema Multiforme—Measles—Pix Liquida; Poisoning—Typhus Fever—Variola.
- Papular Syphilide. See Syphilide, Papular (Index).
- Papule. See Rubella—Scabies—Syphilis; Primary Local Changes from Infection—Variola; Vaccinia.
- Papulo-Pustular Syphilide. See Syphilis; Syphilides.
- Papulous Squamous Syphilide. See Syphilis; Syphilides.
- Paquelin's Thermocautery. See Petroleum; Rhigolene.
- Para-acetanisidin. See Phenacetin; Methacetin.
- Para-acet-phenetidin. See Phenacetin.
- Paracentesis. See Cirrhosis of the Liver; Portal—Empyema—Pericardium; Pericarditis—Pleura; Pneumothorax—Pleurisy; Acute—Pleurisy; Chronic—Uterine Adnexa; Tumors of Ovaries—Wounds and Injuries of Thorax; Hæmorrhage—Wounds and Injuries of Thorax; Operations—Wounds and Injuries of Thorax; Pneumothorax.
- Paracentesis Auriculi. See Wounds and Injuries of Thorax; Puncture of Heart.
- Paracentesis of Ear-drum. See Ear-drum, Paracentesis of (Index).
- Paracentesis of Spinal Canal. See Hydrocephalus, Chronic.
- Paracentesis Pericardii. See Wounds and Injuries of Thorax.
- Paracreasotate of Sodium. See Creasote.
- Paracreasotic Acid. See Creasote.
- Paracresolol. See Salicylic Acid; Cresol-salicylate.
- Paracresol. See Creasote.
- Paracresylic Ether of Salicylic Acid. See Salicylic Acid; Cresol-salicylate.
- Para-di-oxy-benzene. See Resorcin; Hydroquinone.
- Paræsthesia. See Arsenic; Physiological Action—Beriberi—Hyseria—Leukæmia—Locomotor Ataxia—Potassium; Cyanide—Pseudoleukæmia—Spinal Cord; Landry's Paralysis—Strontium; Cutaneous Disorders.
- Paræsthesia of Fingers. See Spinal Cord; Syringomyelia.
- Paræsthesia of Hands. See Spinal Cord; Syringomyelia.
- Paræsthesia, Transitory. See Vascular Diseases of Brain; Thrombosis.
- Paræsthetic Neuroses. See Nerves, Peripheral; Functional Disorders.
- Paraffin. See Acne.
- Paraffin Eruption. See Dermatitis Venenata.
- Paraform. See Formaldehyde.
- Paraformaldehyde. See Formaldehyde.
- Paraformdehyde. See Formaldehyde.
- Paraformicaldehyde. See Formaldehyde.
- PARALDEHYDE (*General Subject*).
- Paraldehyde Poisoning. See Paraldehyde.

- Paralysis.** See Aphasia—Arsenic; Physiological Action—Beriberi—Bright's Disease; Chronic Non-exudative—Cerebral Hæmorrhage—Chloroform; Untoward Effects—Cocainomania—Copaiba; Poisoning—Copper; Poisoning—Cubebs; Physiological Action—Curara; Physiological Action—Diabetes Mellitus—Diphtheria—Diplegia (Index)—Dislocations—Dysentery—Encephalitis; Acute Diffuse Suppurative—Encephalitis; Acute Non-suppurative—Encephalitis; Acute Suppurative—Encephalocèle—Exophthalmic Goitre—Fractures—Head, Injuries of; Cerebral Contusions—Hemiplegia (Index)—Herpes Zoster—Hydrastis; Poisoning—Hydrocephalus; Acute—Hysteria; Motor Symptoms—Influenza—Insanity; Consecutive Dementia—Insanity; General Paresis—Insanity; Idiocy—Insanity; Syphilitic—Lead; Chronic Poisoning—Leprosy; Anaesthetic—Locomotor Ataxia; Ataxia—Malarial Fevers; Pernicious—Meningitis—Mercury; Chronic Poisoning—Monoplegia (Index)—Myxodema—Nerves, Peripheral; Multiple Neuritis—Nerves, Peripheral; Simple Neuritis—Nerves, Wounds and Injuries of—Nux Vomica; Nervous Disorders—Œsophagus; Tumors—Orthopædic Surgery—Club-foot—Paraplegia (Index)—Paresis (Index)—Pelletierine—Penis and Testicles; Phimosis—Pertussis—Petroleum; External Use—Phenacetin; Thymacetin—Physostigma; Physiological Action—Pseudoleukæmia—Rabies—Silver; Poisoning; Acute—Spasms in Children; Hysteria—Specific Infectious Fevers; Relapsing—Spinal Cord; Myelitis—Spinal Cord; Poliomyelitis—Spine, Diseases of; Spinal Localization—Spine, Diseases of; Sprain—Spine, Diseases of; Tumors—Strychnine; Nervous Disorders—Surgical Diseases of the Skin and its Appendages; Lightning-stroke—Syphilis; Period of Sequelæ—Tracheo-Laryngeal Operations; Tracheotomy—Tremors; Paralysis Agitans—Tumors of Brain; Tumors of Pons—Valvular Diseases of Heart; Acute Endocarditis—Vascular Diseases of Brain; Basilar Artery—Wounds of Head; Compression of Brain—Zinc; Poisoning.
- Paralysis, Abducens.** See Strabismus.
- Paralysis, Acute Ascending.** See Spinal Cord; Landry's Paralysis.
- Paralysis, Acute Atrophic.** See Spinal Cord; Poliomyelitis.
- Paralysis Agitans.** See Barium—Boracic Acid; Sodium Biorate—Curara—Exophthalmic Goitre—Hyoscyanus—Hypnotism; Functional Disorders—Mercury; Chronic Poisoning—Phosphorus; Nervous Disorders—Sclerosis of Brain—Tremors.
- Paralysis, Alcoholic.** See Alcoholic Neuritis.
- Paralysis, Bell's.** See Nerves, Peripheral; Simple Neuritis.
- Paralysis, Bulbar.** See Bulbar Paralysis (Index)—Encephalitis; Acute Non-suppurative.
- Paralysis, Cardiac.** See Cardiac Paralysis (Index).
- Paralysis, Cerebral.** See Strychnine; Nervous Disorders.
- Paralysis, Cranial.** See Cerebral Hæmorrhage; Paralysis.
- Paralysis, Crossed.** See Cerebral Hæmorrhage; Paralysis—Tumors of Brain; Tumors of Crus—Tumors of Brain; Tumors of Pons.
- Paralysis, Crutch.** See Nerves, Peripheral; Simple Neuritis.
- Paralysis, Diphtheritic.** See Strychnine; Nervous Disorders.
- Paralysis, Essential, of Children.** See Spinal Cord; Poliomyelitis.
- Paralysis, Facial.** See Facial Paralysis (Index).
- Paralysis, Fourth Nerve.** See Strabismus.
- Paralysis, Glossal.** See Diphtheria.
- Paralysis, Hysterical.** See Cerebral Hæmorrhage; Paralysis.
- Paralysis, Incomplete.** See Diabetes Mellitus.
- Paralysis, Infantile.** See Orthopædic Surgery—Scorbutus, Infantile.
- Paralysis, Infantile Cerebral.** See Encephalitis; Acute Non-suppurative.
- Paralysis, Infantile Spinal.** See Spinal Cord; Poliomyelitis.
- Paralysis, Landry's.** See Spinal Cord, Diseases of—Spinal Cord; Myelitis.
- Paralysis, Laryngeal.** See Laryngeal Paralysis (Index).
- Paralysis, Lead.** See Alcoholic Neuritis—Lead; Chronic Poisoning.
- Paralysis, Nervous.** See Sulphur; Respiratory Disorders.
- Paralysis, Oculomotor.** See Oculomotor Paralysis (Index).
- Paralysis of Adductors of Vocal Cords.** See Hysteria; Motor Symptoms.
- Paralysis of Anus.** See Hysteria; Motor Symptoms.
- Paralysis of Arm.** See Arm, Paralysis of (Index).
- Paralysis of Bladder.** See Bladder, Paralysis of (Index).
- Paralysis of Cerebral Origin.** See Phosphorus; Nervous Disorders.
- Paralysis of Cheeks.** See Wounds of Head; Compression of Brain.
- Paralysis of Cranial Nerves.** See Hydrocephalus; Chronic.
- Paralysis of Diaphragm.** See Diaphragm, Paralysis of (Index).
- Paralysis of Extensors of Foot.** See Diabetes Mellitus.
- Paralysis of External Rectus.** See Rheumatism; Acute.
- Paralysis of Extra-ocular Muscles.** See Strabismus.
- Paralysis of Extremities.** See Diphtheria—Hysteria; Motor Symptoms—Influenza—Meningitis; Internal Pachymeningitis—Meningitis; Spinal Pachymeningitis—Nerves, Wounds and Injuries of.
- Paralysis of Eyelids.** See Eyelids, Paralysis of (Index).
- Paralysis of Eye-muscles.** See Eye-muscles, Paralysis of (Index).
- Paralysis of Heart.** See Heart, Paralysis of (Index).
- Paralysis of Hypoglossal Nerve.** See Head, Injuries of; Cerebral Contusions.
- Paralysis of Insane.** See Encephalitis; Chronic.
- Paralysis of Intercostal Muscles.** See Diphtheria.
- Paralysis of Larynx.** See Larynx, Paralysis of (Index).
- Paralysis of Lips.** See Wounds of Head; Compression of Brain.
- Paralysis of Muscles.** See Tumors of Brain.
- Paralysis of Muscles of Deglutition.** See Nerves, Peripheral; Multiple Neuritis.
- Paralysis of Muscles of Phonation.** See Nerves, Peripheral; Multiple Neuritis.
- Paralysis of Muscles of Respiration.** See Nerves, Peripheral; Multiple Neuritis.
- Paralysis of Neck.** See Diphtheria.
- Paralysis of Nerve.** See Nerve, Paralysis of (Index).
- Paralysis of Ocular Muscles.** See Ocular Muscles, Paralysis of (Index).
- Paralysis of Œsophagus.** See Hysteria; Motor Symptoms.
- Paralysis of One Leg.** See Wounds of Head; Wounds of Brain.
- Paralysis of Palate.** See Diphtheria.
- Paralysis of Pharyngeal Muscles.** See Diphtheria; Severe Cases.
- Paralysis of Pharynx.** See Pharynx, Paralysis of (Index).
- Paralysis of Respiration.** See Respiration, Paralysis of (Index).
- Paralysis of Respiratory Centre.** See Respiratory Centre, Paralysis of (Index).
- Paralysis of Sixth Nerve.** See Pelletierine.
- Paralysis of Sphincter Ani.** See Wounds of Head; Compression of Brain.
- Paralysis of Sphincters.** See Sphincters, Paralysis of (Index).
- Paralysis of Sterno-mastoid Muscle.** See Sterno-mastoid Muscle, Paralysis of (Index).
- Paralysis of Third Nerve.** See Nerve, Paralysis of (Index).
- Paralysis of Tongue.** See Tongue, Paralysis of (Index).
- Paralysis of Trapezius Muscle.** See Nerves, Peripheral; Localized Neuritis.
- Paralysis of Trunk.** See Diphtheria.
- Paralysis of Uvula.** See Diphtheria.
- Paralysis of Vasomotor Centre.** See Chloroform; Physiological Effects.
- Paralysis of Velum Palati.** See Wounds of Head; Compression of Brain.
- Paralysis, Pharyngeal.** See Influenza.
- Paralysis, Post-diphtheritic.** See Locomotor Ataxia.

- Paralysis, Progressive. See Physostigma; Spasmodic Disorders.
- Paralysis, Progressive Bulbar. See Tumors of Brain; Tumors of Medulla.
- Paralysis, Progressive General. See Aphasia; Motor.
- Paralysis, Pseudohypertrophic Muscular. See Muscles.
- Paralysis, Respiratory. See Turpentine; Poisoning.
- Paralysis, Rheumatic. See Sulphur; Respiratory Disorders.
- Paralysis, Spastic Spinal. See Spinal Cord; Primary Lateral Sclerosis.
- Paralysis, Special Atrophic. See Alcoholic Neuritis.
- Paralysis, Toxic Hysterical. See Alcoholic Neuritis.
- Paralysis, Vasomotor. See Strychnine; Gastro-Intestinal Disorders—Veratrum Viride; Physiologic.
- Paralysis, West's Morning. See Spinal Cord; Poliomyelitis.
- Paralytic Chorea. See Chorea; Sydenham's.
- Paralytic Dementia. See Dementia, Paralytic (Index).
- Paralytic Dislocations. See Dislocations—Dislocations; Pathological.
- "Paralytic Feelings" in Fingers. See Influenza.
- Paralytic Strabismus. See Strabismus.
- Parametritis. See Aristol; Gynecology—Ichthyol; Gynecological Disorders.
- Paramorphine. See Opium.
- Paraneuritic Abscess. See Liver; Abscess.
- Paranoia. See Insanity; Catatonia—Insanity; Melancholia—Insanity; Paranoia.
- Paraneurine. See Nucleins.
- Para-oxymethyl-acetanilid. See Phenacetin; Methacetin.
- Paraphenetidin. See Phenacetin.
- Paraphenetolcarbamid. See Phenacetin; Dulcin.
- Paraphimosis. See Penis and Testicles.
- Paraplegia. See Cantharides; Nervous Disorders—Diabetes Mellitus—Encephalitis; Acute Non-suppurative—Exophthalmic Goitre—Hysteria; Motor Symptoms—Spinal Cord; Hereditary Ataxia—Spinal Cord; Poliomyelitis—Spine, Diseases of; Sprain—Syphilis; Period of Sequelae—Toxic Foods; Grain Poisoning—Typhoid Fever.
- Paraplegia, Ataxic. See Ataxic Paraplegia (Index).
- Paraplegia, Spastic. See Meningitis; Acute Spinal Leptomeningitis—Sclerosis of Brain—Spinal Cord; Primary Lateral Sclerosis.
- Parasites. See Tumors; Cysts.
- PARASITES, DISEASES DUE TO (*General Subject*).
- Parasites in Lens. See Lens; Parasites.
- Parasites in Stools. See Parasites; Intestinal.
- Parasites, Intestinal. See Anemia, Pernicious—Parasites.
- Parasites, Tertian. See Malarial Fevers.
- Parasitic Cysts of Spinal Cord. See Spine, Diseases of; Tumors.
- Parasitic Skin Diseases. See Sodium; Cutaneous Disorders.
- Parasitic Stomatitis. See Mouth.
- Parasitic Vulvitis. See Vagina; Vulva; Infectious Vulvitis.
- Parasitical Chyluria. See Chyluria.
- Parasiticide. See Petroleum.
- Parathyroid Glands. See Infantile Myxœdema.
- Paratyphlitis. See Intestines; Typhlitis.
- Parchment Induration. See Syphilis; Initial Lesion.
- Paregoric. See Opium.
- Paresis. See Sulphonal; Physiological Action—Sulphonal; Poisoning—Tremors; Paralysis Agitans—Vascular Diseases of Brain; Embolism—Vascular Diseases of Brain; Thrombosis.
- Paresis, General. See Alcoholic Neuritis—Hyoscyanus—Insanity; Catatonia—Insanity; Consecutive Dementia—Insanity; Cranial Traumatism—Insanity; General Paresis—Insanity; Senile Dementia—Insanity; Melancholia—Insanity; Syphilis—Locomotor Ataxia—Neurasthenia—Sclerosis of Brain.
- Paresis, Intestinal. See Obstruction, Intestinal.
- Paresis of Bladder. See Bladder, Paresis of (Index).
- Paresis of Extremities. See Scarlet Fever.
- Paresis of Left Thigh. See Diabetes Mellitus.
- Paresis of Rectum. See Rectum, Paresis of (Index).
- Paresis, Respiratory. See Cerebral Hemorrhage.
- Paretic Dementia. See Dementia, Paretic.
- Parietal Region, Tumors of. See Tumors of Brain.
- Paris Green. See Arsenic.
- Parkinson's Disease. See Tumors; Paralysis Agitans.
- Parodyne. See Antipyrine.
- Parosmia. See Respiratory Organs; Nasal Neuroses.
- Parosphresia. See Respiratory Organs; Nasal Neuroses.
- Parosteal Osteoma. See Osteoma, Parosteal (Index).
- Parotid Gland, Abscesses of. See Wounds (Septic) and Gangrene; Pyæmia.
- Parotid Gland, Carcinoma of. See Salivary Glands; Tumors.
- Parotid Gland, Chondroma of. See Salivary Glands; Tumors.
- Parotid Gland, Fibroma of. See Salivary Glands; Tumors.
- Parotid Gland, Myxoma of. See Salivary Glands; Tumors.
- Parotid Gland, Tumors of. See Salivary Glands; Tumors.
- Parotitis. See Parotitis.
- PAROTITIS (*General Subject*). See Ichthyol; Miscellaneous Disorders—Jaborandi; Acute Congestion—Laryngitis; Edema—Mumps (Index)—Pneumonia, Lobar—Specific Infectious Fevers; Relapsing.
- Parovarian Cysts. See Uterine Adnexa; Tumors of Fallopian Tubes—Uterine Adnexa; Tumors of Ovaries.
- Parrot's Disease. See Mouth.
- Parsley. See Apiol.
- Partial Thyroidectomy. See Thyroid Gland; Thyroid Fever.
- Partridge-berry. See Gaultheria.
- Parturition. See Chloroform; Therapeutics—Cotton-plant—Erythema Scarlatiniforme.
- PARTURITION, ABNORMAL (*General Subject*).
- Partus Serotinus. See Parturition, Abnormal.
- Passive Congestion of Lungs. See Valvular Diseases of Heart; Mitral Stenosis.
- Passive Hyperæmia. See Vascular System; Vascular Obstruction; Thrombosis.
- Pasta Londoniensis. See Sodium.
- Paste, Canquoin's. See Zinc.
- Paste, Marsden's. See Arsenic—Dermatitis Maligna.
- Pasteurization of Milk. See Nursing and Artificial Feeding.
- Pasteur's Inoculation. See Anthrax—Rabies.
- Patella, Dislocations of. See Dislocations.
- Patella, Fracture of. See Fractures.
- Patency of Ductus Arteriosus. See Valvular Diseases of Heart; Aortic Insufficiency.
- Paulina Cupana. See Guarana.
- Pearlash. See Potassium.
- Pearly Elevations. See Surgical Diseases of the Skin and its Appendages; Milium.
- Pearson's Solution. See Arsenic.
- Pea-soup Stools. See Typhoid Fever.
- Pectin. See Kino.
- Pediculi. See Rectum and Anus; Pruritus Ani.
- Pediculi Corporis. See Mercury; Oxides.
- Pediculi Pubis. See Vagina; Vulva; Parasitic Vulvitis.
- Pediculosis. See Eczema; Psoriasis.
- Pedunculated Tumors. See Surgical Diseases of the Skin and its Appendages; Molluscum Contagiosum.
- Peeled Turkey Colocynth. See Colocynth.
- Pellagra. See Toxic Foods; Grain Poisoning.
- PELLETIERINE (*General Subject*).
- Pelvic Abscess. See Peritoneum; Tuberculous Peritonitis.
- Pelvic Congestion. See Glycerin.
- Pelvic Deformities. See Parturition, Abnormal.
- Pelvic Exudate. See Ichthyol; Gynecological Disorders—Thiol.
- Pelvic Lesions. See Uterine Adnexa; Inflammation of Tubes.
- Pelvic Massage. See Massage, Pelvic (Index)—Uterus; Prolapse—Uterus; Retroflexion.
- Pelvic Neuralgia. See Uterus; Sarcoma.
- Pelvic Suppuration. See Uterine Adnexa; Inflammation of Tubes.
- Pelvimetry. See Parturition, Abnormal.
- Pelvis, Contracted. See Parturition, Abnormal.
- Pelvis, Defective. See Pregnancy, Disorders of.
- Pelvis, Dislocations of. See Dislocations.
- Pelvis, Echinococcal Cysts of. See Syphilis; Period of Sequelae.

- Pelvis, Enchondroma of. See Syphilis; Period of Sequelæ.
- Pelvis, Exostoses of. See Syphilis; Period of Sequelæ.
- Pelvis, Fractures of. See Fractures.
- Pelvis, Sarcomatous Tumors of. See Syphilis; Period of Sequelæ.
- Pelvis, Suppuration of Joints of. See Vascular System; Phlegmasia Alba Dolens.
- PEMPHIGUS (*General Subject*). See Arsenic; Skin Diseases — Belladonna; Cutaneous Disorders — Cinchona; Poisoning — Dermatitis Herpetiformis — Dermatitis Exfoliativa — Erythema Multiforme — Europhen; Wounds — Laryngitis; Symptomatic — Meningitis; Cerebro-Spinal — Pix Liquida; Cutaneous Disorders — Respiratory Organs; Nasal Reflex Neuroses — Scorbutus.
- Pemphigus, Infantile. See Syphilis; Congenital.
- Pemphigus of Conjunctiva. See Conjunctiva; Pemphigus.
- Pencil-shaped Stools. See Obstruction, Intestinal.
- Penis, Absence of. See Penis and Testicles.
- Penis, Adherent. See Penis and Testicles.
- Penis, Amputation of. See Penis and Testicles.
- PENIS AND TESTICLES, DISEASES AND INJURIES OF (*General Subject*).
- Penis, Cancer of. See Penis and Testicles; Phimoses — Penis and Testicles; Tumors.
- Penis, Carcinoma of. See Penis, Cancer of (Index).
- Penis, Chancre of. See Penis and Testicles; Herpes Progenitalis.
- Penis, Chancroid of. See Penis and Testicles; Herpes Progenitalis.
- Penis, Concealed. See Penis and Testicles.
- Penis, Contusion of. See Penis and Testicles; Injuries.
- Penis, Dislocation of. See Penis and Testicles; Injuries.
- Penis, Double. See Penis and Testicles.
- Penis, Extirpation of. See Penis and Testicles.
- Penis, Fracture of. See Penis and Testicles; Injuries.
- Penis, Herpes of. See Herpes Genitalis — Penis and Testicles; Herpes Progenitalis.
- Penis, Horns on. See Penis and Testicles; Tumors.
- Penis, Hypertrophy of. See Penis and Testicles.
- Penis, Lymphangitis of. See Penis and Testicles; Inflammatory Affections.
- Penis, Mucous Patches of. See Penis and Testicles; Herpes Progenitalis.
- Penis, Papillomata of. See Penis and Testicles; Tumors.
- Penis, Phlebitis of. See Penis and Testicles; Inflammatory Affections.
- Penis, Rudimentary Development of. See Penis and Testicles.
- Penis, Sarcoma of. See Penis and Testicles; Tumors.
- Penis, Torsion of. See Penis and Testicles.
- Penis, Tuberculosis of. See Penis and Testicles.
- Penis, Tumors of. See Penis and Testicles; Tumors.
- Penis, Varicose Veins of. See Penis and Testicles; Inflammatory Affections.
- Penis, Vascular Growths of. See Penis and Testicles; Tumors.
- Penis, Wounds of. See Penis and Testicles; Injuries.
- Penitis. See Penis and Testicles; Inflammatory Affections.
- PENTAL (*General Subject*).
- Pental Poisoning. See Pental.
- PENTANE (*General Subject*).
- Penzoldt's Indigo Test. See Acetonuria.
- Peppermint. See Mentha.
- Peppermint Poultice. See Mentha.
- Peppermint-camphor. See Mentha.
- PEPSIN (*General Subject*).
- Peptenzyme. See Bright's Disease; Non-exudative Chronic.
- Peptic Ulcer. See Stomach, Diseases of; Gastric Ulcer.
- Pepto-mangan, Gude's. See Manganese.
- Peptomedullin. See Animal Extracts; Thyroid.
- Peptonized Food. See Pancreatin — Pepsin.
- Peptonized Milk. See Pancreatin.
- Peptonuria. See Rheumatism; Acute — Scarlet Fever.
- Peptothyroidin. See Animal Extracts; Thyroid.
- Peptotoxin. See Toxic Foods; Ptomaines.
- Peptovarin. See Animal Extracts; Thyroid.
- Perchloride-of-Mercury Test. See Albuminuria.
- Perforating Duodenal Ulcer. See Stomach; Surgery of; Intestines; Resection.
- Perforating Peritonitis. See Stomach; Surgery of; Intestines; Thrombosis.
- Perforating Stercoral Ulcer. See Stomach; Surgery of; Intestines.
- Perforating Ulcers. See Ulcers, Perforating (Index).
- Perforation, Gastric. See Stomach, Diseases of; Gastric Ulcer.
- Perforation in Typhoid Fever. See Stomach, Surgery of; Intestines; Resection.
- Perforation, Intestinal. See Intestinal Perforation (Index).
- Perforation of Duodenum. See Duodenum, Perforation of (Index).
- Perforation of Intestines. See Intestines, Perforation of (Index).
- Perforation of Stomach. See Stomach, Perforation of (Index).
- Perforation, Tympanic. See Wounds of Head; Diseases Involving Skull.
- Perforation, Typhoid. See Peritoneum; Acute Peritonitis.
- Periarteritis. See Vascular System; Arteritis.
- Peribronchial Enlargements. See Iodine.
- Peribronchitis. See Pneumonia, Catarrhal.
- Pericardial Effusion. See Dilatation of the Heart — Hypertrophy of the Heart — Pleurisy; Acute.
- Pericardial Sac, Air in. See Pericardium; Pneumopericardium.
- Pericardial Sac, Blood in. See Pericardium; Hæmopericardium.
- Pericardial Sac, Dropsy of. See Pericardium; Hydropericardium.
- Pericardiectomy. See Pericardium; Pericarditis.
- Pericarditis. See Aconite — Cantharides; Respiratory Maladies — Dilatation of the Heart — Elaterium; Liquid Effusions — Mediastinum; Abscess — Pericardium — Pneumonia, Lobar — Rheumatism; Acute — Salicylic Acid; Potassium Salicylate — Scarlet Fever — Specific Infectious Fevers; Terminal Infections — Typhoid Fever — Valvular Diseases of Heart; Aortic Regurgitation — Vascular-Cardiac Neuroses; Irregular Heart.
- Pericarditis, Chronic Adhesive. See Hypertrophy of Heart.
- Pericarditis, Mediastino-. See Mediastino-pericarditis (Index).
- Pericarditis, Serous. See Wounds and Injuries of Thorax; Paracentesis Pericardii.
- Pericardium, Air in. See Pericardium; Pneumopericardium.
- PERICARDIUM, DISEASES OF THE (*General Subject*).
- Pericardium, Extravasations into. See Scorbutus.
- Pericardium, Rupture of. See Wounds and Injuries of Thorax; Rupture of Heart.
- Pericardium, Wounds of. See Wounds and Injuries of Thorax; Wounds of Heart.
- Pericardotomy. See Wounds and Injuries of Thorax.
- Pericellular Cirrhosis. See Cirrhosis of the Liver.
- Perichondritis of Auricle. See External Ear.
- Periencephalitis. See Encephalitis; Chronic.
- Perihepatitis. See Cirrhosis of the Liver; Secondary — Liver.
- Perihepatitis, Generalized Fibroid. See Cirrhosis of the Liver; Portal.
- Perimetritis. See Ichthyol; Gynæcological Disorders.
- Perineal Hernia. See Hernia; Rare Forms.
- Perineal Injuries, Vagino-. See Vagino-Perineal Injuries.
- Perineal Rupture. See Vagino-Perineal Injuries.
- Perineal Section. See Urinary System, Surgical Diseases of; Stricture of Urethra.
- Perineorrhaphy. See Uterus; Prolapse.
- Perinephric Abscess. See Abscess, Perinephric (Index).
- Perineum, Itching of. See Vagita; Eczematous Vaginitis.
- Perineum, Rigidity of. See Parturition, Abnormal.
- Perineum, Spasm of. See Parturition, Abnormal.
- Periodic Strabismus. See Strabismus.
- Perioöphoritis. See Uterine Adnexa; Inflammations of Ovary.
- Periosteal Bridge. See Fractures.
- Periosteal Exostoses. See Tumors; Osteomata.

- Periosteal Swellings. See Syphilis; Primary Local Changes from Infection.
- Periostitis. See Osseous System—Scorbutus, Infantile—Typhoid Fever.
- Periostitis, Alveolo-. See Diabetes Mellitus.
- Periostitis, Chronic. See Sulphur; Respiratory Disorders.
- Periostitis of Cranial Bones. See Wounds of Head; Diseases Involving Skull.
- Periostitis of Great Trochanter. See Hip-joint Disease.
- Periostitis of Orbital Walls. See Orbit; Miscellaneous Diseases.
- Peripheral Neuritis. See Neuritis, Peripheral (Index)—Salicylic Acid.
- Peripheral Neuritis, Palsies from. See Spinal Cord; Poliomyelitis.
- Peripneumonitis. See Sulphur; Respiratory Disorders.
- Peripleuritis. See Wounds and Injuries of Thorax; Secondary Complications.
- Perisplenitis. See Spleen, Diseases of.
- Peristalsis, Increased. See Obstruction, Intestinal.
- Peristaltic Unrest of Stomach. See Stomach, Diseases of; Functional Diseases.
- Peritoneal Cavity, Distension of Lesser. See Pancreas; Cysts.
- Peritoneal Cavity, Fluid in. See Peritoneum; Ascites.
- Peritoneal Effusion. See Magnesia; Serous Effusions.
- Peritoneum, Carcinoma of. See Peritoneum; Tumors.
- PERITONEUM, DISEASES OF THE (*General Subject*).
- Peritoneum, Sarcoma of. See Peritoneum; Tumors.
- Peritonitic Adhesions. See Intestines; Tumors.
- Peritonitis. See Abdomen, Injuries of—Aconite; Meningitis, etc.—Appendicitis—Cystitis—Dysentery; Amœbic—Erysipelas—Ichthyol—Indicanuria—Intestines; Duodenum; Ulceration—Intestines; Typhilitis—Linum—Liver; Acute Perihepatitis—Magnesia; Purgative—Mercury; Metallic—Peritoneum—Potassium; Purgatives—Rheumatism; Muscular—Specific Infectious Fevers; Terminal Infections—Stomach, Diseases of; Gastric Ulcer—Typhoid Fever—Urinary System, Diseases of (Surgical); Injuries of Ureter—Urinary System, Surgical Diseases of; Gonorrhœa in Women; Cervix—Urinary System, Surgical Diseases of; Rupture of Bladder—Uterine Adnexa; Acquired Malformations of Ovaries—Uterine Adnexa; Inflammations of Ovary—Uterine Adnexa; Tumors of Ovaries—Uterus; Carcinoma of Cervix Uteri—Uterus; Sarcoma—Veratrum Viride—Wounds (Septic); Gangrene.
- Peritonitis, Acute Generalized. See Obstruction, Intestinal.
- Peritonitis, Cancerous. See Cancerous Peritonitis (Index)—Cirrhosis of the Liver; Portal—Peritoneum; Tuberculous Peritonitis.
- Peritonitis, Carcinomatous. See Peritoneum; Tuberculous Peritonitis.
- Peritonitis, Chronic. See Cirrhosis of the Liver; Secondary—Uterus; Carcinoma of Corpus Uteri.
- Peritonitis, Local. See Liver; Cancer of Gall-bladder.
- Peritonitis, Localized. See Uterine Adnexa; Inflammation of Tubes.
- Peritonitis, Perforating. See Stomach; Surgery of; Intestines; Thrombosis.
- Peritonitis, Septic. See Uterine Adnexa; Inflammation of Tubes.
- Peritonitis, Tuberculous. See Cirrhosis of the Liver; Portal—Peritoneum; Acute Peritonitis—Peritoneum; Tuberculous Peritonitis—Peritoneum; Tumors.
- Perityphlitic Abscess. See Intestines; Typhilitis.
- Perityphlitic. See Intestines; Typhilitis.
- Periuterine Exudate. See Ichthyol; Gynecological Disorders.
- Permanganate of Potash. See Potash, Permanganate of (Index).
- Permanganate of Potassium. See Potassium, Permanganate of (Index).
- Perniciosa Comatosa Tetanica. See Malarial Fevers; Pernicious.
- Pernicious Anæmia. See Anæmia, Pernicious (Index).
- PERNO (*General Subject*).^a See Benzoin; Abrasions; Chilblains.
- Peroxide of Hydrogen. See Hydrocyanic Acid—Hydrogen Dioxide.
- Persécuteurs Persécutés. See Insanity; Paranoia.
- Perspiration, Clammy. See Sulphur; Poisoning.
- Perspiration, Cold. See Vascular System; Injuries of Blood-vessels; Hemorrhage.
- Perspiration of Feet. See Feet, Perspiration of (Index).
- PERTUSSIS (*General Subject*). See Acetanilid; Nervous Disorders—Aconite—Antipyrine; Nervous Disorders—Asaprol; Respiratory Tract—Belladonna; Spasmodic Disorders—Benzoic Acid—Eucalyptus; Nervous Disorders—Gelsemium; Spasmodic Disorders—Grindelia—Hydrogen Dioxide—Hyoscyamus—Ipecac—Laryngitis; Symptomatic—Lobelia—Measles—Musk—Naphthalin; Respiratory Disorders—Nitroglycerin; Respiratory Disorders—Ozone—Phenocoll—Potassium; Antacids—Quinine; Antispasmodic—Resorcin—Salicylic Acid; Antispasmin—Silver; Pharyngeal Disorders—Silver; Silver Chloride—Whooping-cough (Index)—Zinc; Respiratory Disorders.
- Pes Calcaneus. See Orthopædic Surgery; Club-foot.
- Pes Cavus. See Orthopædic Surgery.
- Pes Equino-valgus. See Orthopædic Surgery; Club-foot.
- Pes Equino-varus. See Orthopædic Surgery; Club-foot.
- Pes Equinus. See Orthopædic Surgery; Club-foot.
- Pes Planus. See Orthopædic Surgery.
- Pes Valgus. See Orthopædic Surgery; Club-foot.
- Pes Varus. See Orthopædic Surgery; Club-foot.
- Pessaries. See Uterine Adnexa; Displacements of Ovary—Uterus; Retroflexion.
- Petaya Bark. See Cinchona.
- Petechiæ. See Antipyrine; Poisoning—Diphtheria—Leukæmia—Plague—Scorbutus—Valvular Diseases of Heart; Acute Endocarditis.
- Petechial Eruption. See Eruption, Petechial.
- Petechial Fever. See Meningitis; Cerebro-Spinal.
- Petechial Spots. See Variola.
- Petit Mal. See Epilepsy.
- Petrolatum. See Petroleum.
- PETROLEUM (*General Subject*). See Pentane.
- Petroleum Eruption. See Dermatitis Venenata.
- Petroleum Poisoning. See Petrolatum.
- Petroleum-jelly. See Petroleum.
- Pettenkofer's Test. See Choluria.
- Pettenkofer's Theory. See Cholera Asiatica.
- Peyer's Patches, Ulceration of. See Typhoid Fever.
- Pfeffer's Spring-water. See Gout.
- Pfeiffer's Bacillus. See Influenza—Pneumonia, Lobar.
- Phagedæna. See Potassium; Caustics—Pyrogallol—Syphilis.
- Phagedæna, Sloughing. See Iron; Venereal Disorders.
- Phagedænic Chancre. See Syphilis.
- Phagocytosis. See Malarial Fevers.
- Phalangeal Fractures. See Fractures.
- Phalline. See Toxic Foods; Poisonous Mushrooms.
- Phalline Poisoning. See Toxic Foods; Poisonous Mushrooms.
- Phantom Tumor. See Pregnancy, Disorders of.
- Phantom Tumor of Abdomen. See Hysteria.
- Pharyngeal Abscess. See Intubation.
- Pharyngeal Catarrh. See Salicylic Acid; Aluminium Salicylate.
- Pharyngeal Diphtheria. See Diphtheria.
- Pharyngeal Disorders. See Ammonium; Respiratory Tract.
- Pharyngeal Muscles, Paralysis of. See Diphtheria; Severe Cases.
- Pharyngeal Paralysis. See Pharynx, Paralysis (Index).
- Pharyngeal Urticaria. See Urticaria.
- Pharyngitis. See Aconite; Respiratory Tract—Alumol; Laryngology—Belladonna; Air-passages—Benzoic Acid—Diabetes Mellitus; Digestive Apparatus—Glycerin—Guaiac—Hamamelis—Astringent—Kino—Krameria—Licorice—Measles—Nucleins—Pelletierine—Salol—Silver; Pharyngeal Disorders—Tonsils; Pharyngitis.
- Pharyngitis, Atrophic. See Tonsils; Atrophic Pharyngitis.
- Pharyngitis, Follicular. See Alumol; Laryngology—Hydrastis; Topical Application.
- Pharyngitis, Naso-. See Naso-pharynx.
- Pharyngitis, Pseudomembranous. See Measles.
- Pharyngitis Sicca. See Ozone—Tonsils; Atrophic Pharyngitis.

- Pharyngitis, Syphilitic. See Tonsils; Syphilitic Pharyngitis.
- Pharyngoceles. See Esophagus; Acquired Diverticula.
- Pharyngo-Faucial Infiltration. See Syphilis; General Infection.
- Pharynx. See Tonsils.
- Pharynx, Adenoma of. See Tonsils; Tumors.
- Pharynx, Anæsthesia of. See Erythroxylon Coca and Cocaine; Topical Administration—Respiratory Organs; Pharyngeal Neuroses.
- Pharynx, Aneurisms of. See Tonsils; Tumors.
- Pharynx, Carcinoma of. See Tonsils; Tumors.
- Pharynx, Cysts of. See Tonsils; Tumors.
- Pharynx, Diseases of. See Deaf-mutism; Abnormalities of Mucous Membrane—Pulmonary Circulation; Hæmorrhage.
- Pharynx, Enchondroma of. See Tonsils; Tumors.
- Pharynx, Fibroma of. See Tonsils; Tumors.
- Pharynx, Foreign Bodies in. See Respiratory Passages.
- Pharynx, Gumma of. See Tonsils; Tumors.
- Pharynx, Hyperæsthesia of. See Respiratory Organs; Pharyngeal Neuroses.
- Pharynx, Lupus of. See Tonsils; Tumors.
- Pharynx, Osteoma of. See Tonsils; Tumors.
- Pharynx, Papilloma of. See Tonsils; Tumors.
- Pharynx, Paræsthesia of. See Respiratory Organs; Pharyngeal Neuroses.
- Pharynx, Paralysis of. See Diphtheria—Hysteria; Motor Symptoms—Influenza—Nerves, Peripheral; Localized Neuritis—Respiratory Organs.
- Pharynx, Sarcoma of. See Tonsils; Tumors.
- Pharynx, Tumors of. See Tonsils; Tumors.
- Phenacethydrizin. See Hydraceticin.
- PHENACETIN (*General Subject*). See Influenza—Phenocoll—Thymol; Thymaceticin.
- Phenacetin Eruption. See Erythema Medicamentosum.
- Phenacetin Poisoning. See Phenacetin.
- Phenazonum. See Antipyrine.
- Phenetidin. See Phenacetin; Lactophenin.
- Phenic (Carbolic) Acid Poisoning. See Phenic Acid.
- PHENIC, OR CARBOLIC, ACID AND DERIVATIVES (*General Subject*).
- PHENOCOLL (*General Subject*). See Malarial Fevers.
- Phenol. See Iodine; Sozoiodol—Phenic (Carbolic) Acid—Picric Acid—Potassium; Sozoiodolate—Pyrogallol—Salicylic Acid; Salicylic Aldehyde—Salol—Thymol.
- Phenol in Urine. See Hæmaturia.
- Phenol-camphor. See Camphor.
- Phenol-salicylate. See Salol.
- Phenosalyl. See Phenic (Carbolic) Acid.
- Phenyl-acetyl-hydrazin. See Hydraceticin.
- Phenyl-chloral. See Chloral.
- Phenyl-hydrate. See Phenic (Carbolic) Acid.
- Phenylhydrazin. See Hydraceticin.
- Phenylhydrazin Test for Glucose. See Diabetes Mellitus.
- Phenylic Acid. See Phenic (Carbolic) Acid.
- Phenylic Alcohol. See Phenic (Carbolic) Acid.
- Phenylone. See Antipyrine.
- Phenyl-salicylate. See Salicylic Acid.
- Phimosis. See Penis and Testicles.
- Phlebitis. See Status Lymphaticus; Lymphangitis—Sulphur; Respiratory Disorders—Typhoid Fever—Vagina; Vulva; Varicocele—Vagina; Vulva; Vulvitis—Vascular System; Injuries of Veins—Vascular System; Phlegmasia Alba Dolens—Vascular System; Varix—Vascular System; Veins.
- Phlebitis of Penis. See Penis and Testicles; Inflammatory Affections.
- Phlebitis of Prostatic Plexus. See Urinary System, Surgical Diseases of; Wounds of Prostate.
- Phlebitis, Sinus-. See Cerebral Abscess.
- Phlebitis, Syphilitic. See Syphilis; Period of Sequelæ.
- Phlegmasia Alba Dolens. See Pneumonia, Lobar—Vascular System.
- Phlegmasia Dolens. See Creasol; Septic Diseases—Typhoid Fever.
- Phlegmon. See Hydrogen Dioxide; Purulent Affections—Silver; Unguentum Credé.
- Phlegmon of Thorax. See Wounds and Injuries of Thorax; Secondary Complications.
- Phlegmon, Simulated. See Iodine; Iodoform.
- Phlegmonous Angina. See Silver; Unguentum Credé.
- Phlegmonous Eruptions. See Dermatitis Medicamentosa.
- Phlegmonous Gastritis. See Stomach, Diseases of.
- Phlegmonous Inflammations. See Sodium; Surgical Disorders.
- Phlegmonous Tonsillitis. See Tonsils; Tonsillitis.
- Phloridzin. See Diabetes Mellitus—Glycosuria.
- Phlyctenular Conjunctivitis. See Conjunctivitis, Phlyctenular (Index).
- Phlyctenular Keratitis. See Keratitis, Phlyctenular (Index).
- Phlyctenule. See Conjunctiva; Phlyctenular Conjunctivitis.
- Phonation, Paralysis of Muscles of. See Nerves, Peripheral; Multiple Neuritis.
- Phono-massage. See Internal Ear.
- Phosphates. See Phosphorus.
- Phosphates in Urine. See Phosphaturia.
- PHOSPHATURIA (*General Subject*). See Neurasthenia—Nitric Acid; Internal Uses—Osseous System; Rickets.
- Phosphoric-Acid Eruption. See Dermatitis Medicamentosa.
- PHOSPHORIC AND HYPOPHOSPHOROUS ACIDS (*General Subject*).
- PHOSPHORUS (*General Subject*). See Bright's Disease; Acute—Endometritis—Nucleins.
- Phosphorus Necrosis. See Jaw.
- Phosphorus Poisoning. See Copper—Fatty Heart—Jaundice; Toxæmia—Liver; Acute Yellow Atrophy—Manganese; Antidote—Mouth; Ulcerative Stomatitis—Olive-oil—Phosphorus.
- Photophobia. See Astigmatism—Conjunctiva; Diseases of—Cornea; Foreign Bodies—Keratitis—Measles—Meningitis; Leptomenigitis; Cerebro-Spinal—Tension of Eyeball; Diminished.
- Phthical Laryngitis. See Tuberculosis of Larynx.
- Phthisis. See Abortion; Pulmonary Diseases—Acetanilid—Amylene-hydrate; Pulmonary Disorders—Aristol—Arsenic; Pulmonary Disorders—Calcium; Alternatives—Copper; Tuberculosis—Creasote; Pulmonary Diseases—Diabetes Mellitus; Complication; Pulmonary Apparatus—Digitalis—Dilatation of the Heart—Glycerin—Gold—Hydrochloric Acid—Hydrogen Dioxide—Hypertrophy of the Heart—Ichthyol—Iodine; Diseases of Respiratory Tract—Lungs, Tuberculosis of (Index)—Nux Vomica; Pulmonary Disorders—Ozone—Petroleum—Phenacetin; Methaceticin—Phosphorus; Phosphates—Pleura; Pneumothorax—Pulmonary Tuberculosis (Index)—Silver; Pharyngeal Disorders—Strychnine; Pulmonary Disorders—Sulphonal—Thymol—Tuberculosis of Lungs—Turpentine.
- Phthisis, Acute Pneumonic. See Pneumonia, Lobar.
- Phthisis Bulbi. See Iris, Purulent Inflammation—Leprosy.
- Phthisis, Chronic Ulcerative. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
- Phthisis, Cough of. See Cannabis Indica; Respiratory Diseases—Gelsemium; Spasmodic Disorders.
- Phthisis, Fibroid. See Tuberculosis of Lungs.
- Phthisis Florida. See Tuberculosis of Lungs.
- Phthisis, Hectic Fever of. See Quinine; Antipyretic Action.
- Phthisis, Laryngeal. See Silver; Pharyngeal Disorders.
- Phthisis, Night-cough of. See Chloral; Respiratory Diseases.
- Phthisis, Night-sweats of. See Agaricin—Atropine; Diaphoresis—Camphor; Camphoric Acid—Homatropine—Iodine; Aristol—Physostigma; Respiratory Disorders—Potassium; Tellurate—Quinine—Silver; Pharyngeal Disorders—Tuberculosis of Lungs; Chronic Ulcerative Phthisis—Zinc; Respiratory Disorders.
- Phthisis, Pulmonary. See Phthisis (Index)—Tuberculosis of Larynx.
- Phthisis, Stone-cutters'. See Pneumonokoniosis.
- Phthisis, Vomiting of. See Strychnine; Gastro-Intestinal Disorders.
- Physosterin. See Physostigma.
- PHYSOSTIGMA (*General Subject*).
- Physostigma Poisoning. See Physostigma—Strychnine; Antidotal Uses.
- Physostigmine. See Alkaloids—Physostigma.
- Physostigmine, Poisoning by. See Atropine; Antidotal Uses—Physostigma.

- Phyostigmine Salicylate. See Salicylic Acid.
 Phytolacca. See *Veratrum Viride*.
 PICRIC ACID (*General Subject*). See *Choluria*—*Ec-zema*.
 Picric-Acid Test. See *Albuminuria*.
 Picronic Acid. See *Picric Acid*.
 Piconitric Acid. See *Picric Acid*.
 Pieropodophyllin Acid. See *Podophyllum*.
 Pieropodophyllin. See *Podophyllum*.
 Pigeon-breast. See *Naso-pharynx*; *Adenoids*—*Os-seous System*; *Rickets*.
 Pigmentation of Skin. See *Skin*, *Pigmentation of* (Index).
 Piles. See *Hæmorrhoids* (Index).
 Pilocarpine. See *Bright's Disease*—*Jaborandi*.
 Pilocarpine Eruption. See *Dermatitis Medicamen-tosa*.
 Pilocarpine Hydrochlorate. See *Alkaloids*.
 Pilocarpine Poisoning. See *Jaborandi*.
 Pilocarpus. See *Jaborandi*.
 Pineal Gland, Disorders of. See *Myxœdema*.
 Pinguecula. See *Conjunctiva*; *Miscellaneous Dis-orders*.
 Piperazidin. See *Piperazin*.
 PIPERAZIN (*General Subject*). See *Gout*.
 Piperazin Poisoning. See *Piperazin*.
 Piperine. See *Alkaloids*.
 Piri-piri. See *Beriberi*.
 Piscidia Erythrina. See *Myocarditis*.
 Pitch. See *Pix Liquida*.
 Pithead. See *Parasites*, *Intestinal*; *Tape-worms*.
 Pituitary Body, Disorders of. See *Acromegaly*—*Myxœdema*.
 Pituitary Extract. See *Animal Extracts*.
 Pityriasis. See *Benzoin*; *Eczema*, *Pityriasis*—*Derm-atitis Exfoliativa*—*Iodine*; *Skin Disorders*—*Seborrhœa*—*Thymol*.
 Pityriasis Rosea of Gilbert and Duhring. See *Derm-atitis Exfoliativa*; *Local*.
 Pityriasis Rubra of Hebra. See *Dermatitis Exfoliati-va*; *Chronic General*.
 Pityriasis Versicolor. See *Anthrax*—*Phenic* (Carbolic) Acid; *Cutaneous Disorders*—*Sodium*; *Cutaneous Disorders*.
 PIX LIQUIDA (*General Subject*).
 Pix-Liquida Poisoning. See *Pix Liquida*.
 Pixol. See *Pix Liquida*.
 Placenta Prævia, Hæmorrhage from. See *Sodium*; *Gynæcological Disorders*.
 Placenta, Retention of. See *Abortion*, *Retention of* *Secundines*.
 PLAGUE (BUBONIC PLAGUE) (*General Subject*).
 Plague. See *Parotitis*, *Symptomatic*.
 Plaque, Indurated. See *Syphilis*.
 Plaques Muqueuses. See *Syphilis*; *General Infec-tion*.
 Plaques Pterygoidiennes. See *Mouth*; *Bednar's Aphthæ*.
 Plasmodium Malarie. See *Malarial Fevers*—*Yellow Fever*.
 Plaster, Lead-. See *Olive-oil*.
 Plaster Jacket. See *Fractures*; *Vertebræ*.
 Plaster-of-Paris Bandage. See *Orthopædic Surgery*.
 Plaster-of-Paris Dressing. See *Osseous System*.
 Plaster-of-Paris Jacket. See *Fractures*; *Vertebræ*—*Spine*, *Diseases of*; *Scoliosis*—*Spine*, *Diseases of*; *Tuberculosis*.
 Plaster-of-Paris Splints. See *Fractures*.
 Plasters, Warming-. See *Cantharides*.
 Plastic Bronchitis. See *Bronchitis*; *Fibrinous*.
 PLASTIC SURGERY (*General Subject*).
 Plethora. See *Potassium*; *Purgatives*.
 Plethora, Abdominal. See *Sulphur*; *Cutaneous Dis-orders*.
 Pleura, Carcinoma of. See *Pleura*; *New Growths*.
 PLEURA, DISEASES OF (*General Subject*).
 Pleura, Extravasations into. See *Scorbutus*.
 Pleura, Inflation of, with Nitrogen-gas. See *Wounds and Injuries of Thorax*.
 Pleura, Injuries of. See *Wounds and Injuries of Thorax*; *Injuries of Thoracic Viscera*.
 Pleura, Rupture of. See *Wounds and Injuries of Thorax*; *Fractures*.
 Pleura, Sarcoma of. See *Pleura*; *New Growths*.
 Pleura, Wounds of. See *Wounds and Injuries of Thorax*; *Injuries of Pleura*.
 Pleural Effusion. See *Empyema*—*Iodine*; *Respira-tory Tract*—*Liver*; *Hydatid Cyst*—*Magnesia*; *Serous Effusions*—*Paraldehyde*—*Pneumonia*, *Lobar*—*Uterine Adnexa*; *Tumors of Ovaries*.
 Pleural Hæmorrhage. See *Pleura*; *Hæmothorax*.
 PLEURISY (*General Subject*). See *Aconite*; *Respira-tory Tract*—*Cholelithiasis*—*Digitalis*—*Elate-rium*; *Liquid Effusions*—*Gelsemium*; *Fevers*—*Guaiaicol*; *Fever*—*Herpes Zoster*—*Infants*, *Diarrhoeal Diseases of*; *Inflammatory Diarrhoeas*—*Linum*—*Mercury*; *Chlorides*—*Pericardium*; *Peri-carditis*—*Pleura*; *New Growths*—*Pneumonia*, *Lobar*—*Potassium*; *Purgatives*—*Pulmonary Cir-culation*; *Atelectasis*—*Quinine*; *Inflammation*—*Rheumatism*; *Muscular*—*Salicylic Acid*—*Salicylic Acid*; *Antipyrine Salicylate*—*Salicylic Acid*; *Potassium Salicylate*—*Salicylic Acid*; *Sodium Borosalicylate*—*Salicylic Acid*; *Strontium Salicylate*—*Specific Infectious Fevers*; *Terminal In-fections*—*Tumors of Larynx and Lungs*; *Carci-noma of Lungs*—*Typhoid Fever*—*Valvular Dis-eases of Heart*; *Acute Endocarditis*—*Veratrum Viride*—*Wounds* (Septic) and *Gangrene*; *Pyæmia*—*Wounds and Injuries of Thorax*; *Hæmorrhage*—*Wounds and Injuries of Thorax*; *Injuries of Pleura*—*Wounds and Injuries of Thorax*; *Mural Injuries*—*Wounds and Injuries of Thorax*; *Rupture of Lung*—*Wounds and Injuries of Thorax*; *Secondary Complications*.
 Pleurisy, Chylous. See *Pleura*; *Chylothorax*.
 Pleurisy, Dry. See *Tuberculosis of Lungs*; *Chronic Ulcerative Phthisis*.
 Pleurisy, Exudative. See *Mustard*; *Respiratory Tract*.
 Pleurisy, Interlobular. See *Empyema*.
 Pleurisy, Pulsating. See *Aneurism*—*Liver*; *Ab-scess*—*Pleurisy*; *Acute*.
 Pleurisy, Purulent. See *Liver*; *Hydatid Cyst*.
 Pleurisy, Rheumatic. See *Rheumatism*; *Acute*.
 Pleurisy, Right-sided. See *Cirrhosis of the Liver*; *Portal*.
 Pleurisy, Streptococcal. See *Pleurisy*; *Acute*.
 Pleurisy, Suppurating. See *Empyema*.
 Pleuritic Effusions. See *Pleural Effusions* (Index)—*Uterine Adnexa*; *Tumors of Ovaries*.
 Pleuritic Pain. See *Pulmonary Circulation*; *Em-bolism*.
 Pleuritis. See *Cantharides*; *Respiratory Diseases*—*Pleurisy*.
 Pleurodynia. See *Erythroxylon Coca and Cocaine*; *Neuralgia*—*Iodine*; *Respiratory Tract*—*Neural-gia*; *Intercostal*—*Pleurisy*; *Acute*—*Pleurisy*; *Diaphragmatic*.
 Pleuro-pericarditis. See *Pericardium*; *Pericarditis*.
 Plexiform Angioma. See *Tumors*; *Connective Tis-sue*.
 Plexiform Neuroma. See *Neuroma*, *Plexiform* (In-dex).
 Plica Polonica. See *Sodium*; *Cutaneous Disorders*.
 Plumbism. See *Lead*; *Chronic Lead Poisoning*.
 Plumbum. See *Lead*.
 Plummer's Pill. See *Guaiaic*.
 Pneumatic Massage. See *Internal Ear*.
 Pneumatocœle of Scalp. See *Wounds of Head*; *Tu-mors of Scalp*.
 Pneumatosis. See *Stomach*, *Diseases of*; *Functional Diseases*.
 Pneumaturia. See *Diabetes Mellitus*.
 Pneumectomy. See *Wounds and Injuries of Thorax*.
 Pneumocœle. See *Wounds and Injuries of Thorax*; *Hernia of Lung*.
 Pneumococcus. See *Meningitis*; *Cerebro-Spinal*—*Pleurisy*; *Acute*—*Pneumonia*, *Lobar*.
 Pneumococcus, Fränkel's. See *Pneumonia*, *Lobar*.
 Pneumogastric Nerve, Functional Disorders of. See *Hydrocyanic Acid*.
 Pneumogastric Nerve, Neuritis of. See *Nerves*, *Peripheral*; *Localized Neuritis*.
 Pneumohæmothorax. See *Wounds and Injuries of Thorax*; *Hæmorrhage*—*Wounds and Injuries of Thorax*; *Injuries of Pleura*—*Wounds and Injuries of Thorax*; *Rupture of Lung*—*Wounds and Injuries of Thorax*; *Wounds of Heart*.
 Pneumomassage. See *Middle Ear*; *Acute Otitis*.
 Pneumonectomy. See *Pulmonary Abscess and Gan-grene*—*Tumors of Larynx*; *Sarcoma of Lungs*.
 Pneumonia. See *Abortion*—*Aconite*; *Respiratory Tract*—*Aconitine*—*Alcohol*—*Asaprol*; *Respira-tory Tract*—*Asthma*—*Antipyrine*—*Benzanilid*—*Bright's Disease*; *Acute*—*Calcium*—*Cantharides*; *Respiratory Maladies*—*Coffee*; *Caffeine*—*Crea-sote*—*Croup*; *Catarrhal*—*Diabetes Mellitus*—*Digitalis*—*Diphtheria*—*Erysipelas*—*Ether*; *After-effects*—*Gelsemium*; *Fevers*—*Glycosuria*—*Indi-canuria*—*Infantile Myxœdema*—*Infants*, *Diarrhoeal Diseases of*; *Inflammatory Diarrhoeas*—

- Influenza—Insanity: Acute Confusional—Iodine; Respiratory Tract—Jaborandi; Acute Congestion—Linum—Malarial Fevers—Meningitis; Leptomeningitis—Mercury; Chlorides—Musk—Mustard; Respiratory Tract—Nitroglycerin; Respiratory Disorders—Nux Vomica; Pulmonary Disorders—Oxygen; Inhalation—Pancreatin—Pericardium; Pericarditis—Phenacetin; Lactophenin—Phenacetin; Methacetin—Phosphorus; Febrile Disorders—Pleurisy; Acute—Potassium; Febrifuges—Pseudoleukæmia—Pulmonary Abscess—Pulmonary Circulation; Atelectasis—Pulmonary Circulation; Oedema—Quinine; Inflammation—Scarlet Fever—Strychnine; Pulmonary Disorders—Tumors of Larynx and Lungs; Carcinoma of Larynx—Typhoid Fever—Valvular Diseases of Heart; Acute Endocarditis—Variola—Veratrum Viride—Wounds and Injuries of Thorax; Secondary Complications.
- Pneumonia, Alcoholic. See Pneumonia, Lobar.
- Pneumonia, Bilious. See Pneumonia, Lobar.
- Pneumonia, Broncho-. See Broncho-pneumonia (Index).
- PNEUMONIA, CATARRHAL, OR BRONCHO-PNEUMONIA (*General Subject*). See Broncho-pneumonia (Index).
- Pneumonia, Chronic Interstitial. See Pertussis.
- Pneumonia, Collapse in. See Nitroglycerin.
- Pneumonia, Crossed. See Pneumonia, Lobar.
- Pneumonia, Croupous. See Mustard—Pneumonia, Lobar—Typhoid Fever; Complications.
- Pneumonia, Deglutition. See Pneumonia, Catarrhal.
- Pneumonia, Double. See Pneumonia, Lobar.
- Pneumonia in Childhood. See Pneumonia, Lobar.
- PNEUMONIA, LOBAR (*General Subject*). See Plague—Pneumonia, Catarrhal—Tuberculosis of Lungs; Phthisis Florida.
- Pneumonia, Lobular. See Pneumonia, Catarrhal.
- Pneumonia, Migratory. See Pneumonia, Lobar.
- Pneumonia of Aged. See Pneumonia, Lobar.
- Pneumonia, Septic. See Toxic Foods; Grain Poisoning.
- Pneumonia, Typhoid. See Phosphorus—Pneumonia, Lobar.
- Pneumonia, Wandering. See Pneumonia, Lobar.
- Pneumonic Plague. See Plague.
- Pneumonic Symptoms. See Toxic Foods; Meat Poisoning.
- Pneumonitis. See Pneumonia, Lobar.
- Pneumonitis, Suppurative. See Pulmonary Abscess.
- PNEUMONOKONIOSIS (*General Subject*).
- Pneumonotomy. See Pulmonary Abscess and Gangrene.
- Pneumopericardium. See Pericardium—Wounds and Injuries of Thorax; Wounds of Heart.
- Pneumorrhagia. See Pulmonary Circulation; Hæmorrhage.
- Pneumothorax. See Hypertrophy of the Heart—Liver; Acute Perihepatitis—Pleura—Wounds and Injuries of Thorax; Injuries of Pleura—Wounds and Injuries of Thorax; Pneumothorax—Wounds and Injuries of Thorax, Rupture of Lung.
- Pneumotomy. See Bronchiectasis—Wounds and Injuries of Thorax.
- Pneumotomy, Injections after. See Boracic Acid.
- Pneumotoxin. See Pneumonia, Lobar.
- Pneumotyphus. See Pneumonia, Lobar.
- Po de Bahia. See Chrysarobin.
- Podagra. See Gout.
- Podophyllotoxin. See Podophyllum.
- PODOPHYLLUM (*General Subject*).
- Podophyllum Poisoning. See Podophyllum.
- Poikilocytes. See Anæmia, Pernicious.
- Poikilocytosis. See Anæmia, Pernicious—Stomach, Diseases of: Carcinoma.
- Poison-ivy Eruption. See Dermatitis Venenata—Grindelia—Lead; External Application—Lobelia—Sodium; Cutaneous Disorders.
- Poison-nut. See Nux Vomica.
- Poison-oak Eruption. See Dermatitis Venenata—Grindelia.
- Poison-sunach Eruption. See Dermatitis Venenata.
- Poisoning, Absinthium. See Absinthium.
- Poisoning, Acetanilid. See Acetanilid.
- Poisoning, Acetic Acid. See Acetic Acid.
- Poisoning, Acetylene. See Acetylene.
- Poisoning, Aconite. See Aconite.
- Poisoning, Aconitine. See Aconitine.
- Poisoning, Adonis. See Adonis.
- Poisoning, Aiol. See Aiol.
- Poisoning, Alcohol. See Alcohol.
- Poisoning, Ammonia. See Ammonia.
- Poisoning, Ammonium. See Ammonium.
- Poisoning, Amylene-hydrate. See Amylene-hydrate.
- Poisoning, Antipyrine. See Antipyrine.
- Poisoning, Apomorphine. See Apomorphine.
- Poisoning, Arsenic. See Arsenic Poisoning (Index).
- Poisoning, Atropine. See Atropine, Poisoning (Index).
- Poisoning, Belladonna. See Belladonna.
- Poisoning, Bismuth. See Bismuth.
- Poisoning, Caffeine. See Coffee; Caffeine.
- Poisoning, Cannabis Indica. See Cannabis Indica.
- Poisoning, Canned Meat. See Cholera Morbus—Toxic Foods.
- Poisoning, Cantharides. See Cantharides.
- Poisoning, Carbolic Acid. See Phenic Acid.
- Poisoning, Carbon Dioxide. See Sodium; Antidotal Uses.
- Poisoning, Carbon Sulphide. See Hysteria.
- Poisoning, Carbonic Oxide. See Glycosuria.
- Poisoning, Cheese. See Cheese Poisoning (Index).
- Poisoning, Chicken. See Toxic Foods; Meat Poisoning.
- Poisoning, Chicken-pea. See Toxic Foods; Grain Poisoning.
- Poisoning, Chloral. See Chloral Poisoning (Index).
- Poisoning, Chloroform. See Chloroform Poisoning (Index).
- Poisoning, Cimicifuga. See Cimicifuga.
- Poisoning, Cinchona. See Cinchona.
- Poisoning, Coal-gas. See Sodium; Antidotal Uses.
- Poisoning, Cocaine. See Cocaine Poisoning (Index)—Erythroxylon Coca.
- Poisoning, Coffee. See Coffee.
- Poisoning, Copaiba. See Copaiba.
- Poisoning, Copper. See Copper.
- Poisoning, Corn. See Toxic Foods; Grain Poisoning.
- Poisoning, Crab. See Toxic Foods; Shell-fish Poisoning.
- Poisoning, Cream. See Toxic Foods.
- Poisoning, Curara. See Curara.
- Poisoning, Digitalis. See Digitalis.
- Poisoning, Elaterium. See Elaterium.
- Poisoning, Ergot. See Ergot.
- Poisoning, Eserine. See Atropine; Antidotal Uses.
- Poisoning, Ethyl-chloride. See Ethyl-chloride.
- Poisoning, Eucalyptus. See Eucalyptus.
- Poisoning, Exalgine. See Exalgine.
- Poisoning, Fish. See Toxic Foods; Shell-fish Poisoning.
- Poisoning, Fowl. See Toxic Foods; Meat Poisoning.
- Poisoning, Gaultheria. See Gaultheria.
- Poisoning, Gelsemium. See Gelsemium.
- Poisoning, Gold. See Gold.
- Poisoning, Goose. See Toxic Foods; Meat Poisoning.
- Poisoning, Grain. See Toxic Foods.
- Poisoning, Guaiacol. See Guaiacol.
- Poisoning, Ham. See Toxic Foods; Meat Poisoning.
- Poisoning, Homatropine. See Homatropine.
- Poisoning, Hydracetin. See Hydracetin.
- Poisoning, Hydrastis. See Hydrastis.
- Poisoning, Hydrochloric Acid. See Hydrochloric Acid.
- Poisoning, Hydrocyanic Acid. See Hydrocyanic Acid.
- Poisoning, Ice-cream. See Ice-cream Poisoning (Index).
- Poisoning, Iodine. See Iodine.
- Poisoning, Iodoform. See Iodine; Iodoform—Sodium; Antidotal Uses.
- Poisoning, Ipecacuanha. See Ipecac.
- Poisoning, Irritant. See Olive-oil—Pancreas; Acute Pancreatitis.
- Poisoning, Jaborandi. See Jaborandi.
- Poisoning, Jalap. See Jalap.
- Poisoning, Jequrity. See Jequrity.
- Poisoning, Juniper. See Juniper.
- Poisoning, Lactophenin. See Jaundice; Toxæmia.
- Poisoning, Lamb. See Toxic Foods; Meat Poisoning.
- Poisoning, Lead. See Lead Poisoning (Index).
- Poisoning, Lobelia. See Lobelia.
- Poisoning, Lobster. See Toxic Foods; Shell-fish Poisoning.
- Poisoning, Male Fern. See Male Fern.

- Poisoning, Manganese. See Manganese.
 Poisoning, Meat. See Toxic Foods.
 Poisoning, Mercury. See Mercury — Mercury Poisoning (Index).
 Poisoning, Metallic. See Sulphur; Respiratory Disorders.
 Poisoning, Morphine. See Morphine Poisoning (Index).
 Poisoning, Muscarine. See Toxic Foods; Poisonous Mushrooms.
 Poisoning, Mushroom. See Toxic Foods.
 Poisoning, Mutton. See Toxic Foods; Meat Poisoning.
 Poisoning, Narcotic. See Narcotic Poisoning (Index).
 Poisoning, Nitric Acid. See Nitric Acid.
 Poisoning, Nitrites. See Nitrites.
 Poisoning, Nitrobenzene. See Nitrobenzene.
 Poisoning, Nitrobenzol. See Glycosuria.
 Poisoning, Nitroglycerin. See Nitroglycerin.
 Poisoning, Nux Vomica. See Nux Vomica.
 Poisoning, Opium. See Opium Poisoning (Index).
 Poisoning, Oxalic Acid. See Oxalic Acid.
 Poisoning, Oyster. See Toxic Foods; Shell-fish Poisoning.
 Poisoning, Paraldehyde. See Paraldehyde.
 Poisoning, Pental. See Pental.
 Poisoning, Petroleum. See Petroleum.
 Poisoning, Phalline. See Toxic Foods; Poisonous Mushrooms.
 Poisoning, Phenacetin. See Phenacetin.
 Poisoning, Phenic (Carbolic) Acid. See Phenic Acid.
 Poisoning, Phosphorus. See Phosphorus Poisoning (Index).
 Poisoning, Physostigma. See Physostigma—Strychnine; Antidotal Uses.
 Poisoning, Physostigmine. See Atropine; Antidotal Uses.
 Poisoning, Pilocarpine. See Jaborandi.
 Poisoning, Piperazin. See Piperazin.
 Poisoning, Pix Liquida. See Pix Liquida.
 Poisoning, Podophyllum. See Podophyllum.
 Poisoning, Pork-pie. See Toxic Foods; Meat Poisoning.
 Poisoning, Potassium. See Potassium.
 Poisoning, Prussic Acid. See Glycosuria.
 Poisoning, Ptomaine. See Mercury; Iodides—Toxic Foods.
 Poisoning, Pyrogallol. See Pyrogallol.
 Poisoning, Quassia. See Quassia.
 Poisoning, Quebracho. See Quebracho.
 Poisoning, Quinine. See Quinine.
 Poisoning, Salicylate. See Glycosuria.
 Poisoning, Salted Salmon. See Toxic Foods; Shell-fish Poisoning.
 Poisoning, Salted Sturgeon. See Toxic Foods; Shell-fish Poisoning.
 Poisoning, Sausage. See Toxic Foods; Meat Poisoning.
 Poisoning, Secale Cornutum. See Glycosuria.
 Poisoning, Septic. See Peritoneum; Acute Peritonitis.
 Poisoning, Sewer-gas. See Erythema Scarlatini-forme.
 Poisoning, Shell-fish. See Toxic Foods.
 Poisoning, Shrimps. See Toxic Foods; Shell-fish Poisoning.
 Poisoning, Silver Nitrate. See Silver.
 Poisoning, Sodium. See Sodium.
 Poisoning, Sorrel. See Oxalic Acid.
 Poisoning, Sprouting Potato. See Toxic Foods; Grain Poisoning.
 Poisoning, Strophanthus. See Strophanthus.
 Poisoning, Strychnine. See Strychnine.
 Poisoning, Sulphonal. See Sulphonal.
 Poisoning, Sulphur. See Sulphur.
 Poisoning, Thymol. See Thymol.
 Poisoning, Toxin. See Stomach; Surgery of; Intestines; Enterotomy.
 Poisoning, Turkey. See Toxic Foods; Meat Poisoning.
 Poisoning, Veal-pie. See Toxic Foods; Meat Poisoning.
 Poisoning, Vegetable. See Toxic Foods; Grain Poisoning.
 Poisoning, Zinc Salt. See Zinc.
 Poisonous Mushrooms. See Toxic Foods.
 Poke, Indian. See Veratrum Viride.
 Poke-berries. See Veratrum Viride.
 Poke-root. See Veratrum Viride.
 Polioencephalitis Inferior. See Encephalitis.
 Polioencephalitis Superior. See Encephalitis.
 Poliomyelitis. See Spinal Cord—Typhoid Fever.
 Poliomyelitis, Acute Anterior. See Chorea—Nerves, Peripheral; Multiple Neuritis — Scorbutus, Infantile.
 Polyarthritides Deformans. See Gout; Rheumatoid Arthritis—Rheumatism; Chronic Articular.
 Polyarthritides Rheumatica sine Arthritide. See Rheumatism; Acute.
 Polyarticular Inflammation. See Specific Infectious Fevers; Relapsing.
 Polychromia, Jaundice of. See Jaundice; Toxæmic.
 Polycoria. See Iris, Ciliary Body, and Choroid; Anomalies.
 Polydipsia. See Diabetes Insipidus—Exophthalmic Goitre.
 Polymyositis. See Muscles—Parasites; Trichina.
 Polyneuritis. See Muscles; Polymyositis — Nerves, Peripheral; Multiple Neuritis — Rheumatism; Acute.
 Polyopia. See Astigmatism; Irregular.
 Polyorchism. See Penis and Testicles; Anomalies of Testicles.
 Polyp of the Conjunctiva. See Conjunctiva; Tumors.
 Polyp, Uterine. See Erythroxyton Coca and Cocaine; Gynecology.
 Polypi. See Encephalocoele—Hæmorrhoids—Tumors—Tumors; Fibromata.
 Polypi, Aural. See Aural Polypi (Index).
 Polypi, Laryngeal. See Erythroxyton Coca and Cocaine; Nose; Pharynx.
 Polypi, Nasal. See Nasal Polypi (Index).
 Polypi, Uterine. See Erythroxyton Coca and Cocaine; Gynecology.
 Polypoid Growths. See Rectum and Anus; Prolapse of Rectum.
 Polyps of Prostatic Urethra. See Urinary System, Surgical Diseases of.
 Polypus, Fibroid. See Uterus; Inversion.
 Polypus of Fallopian Tube. See Uterine Adnexa; Tumors of Fallopian Tubes.
 Polypus of Rectum, Villous. See Tumors of Rectum and Anus; Papillomata.
 Polysarcia Adiposa. See Fatty Heart and Obesity.
 Polyuria. See Cystitis — Diabetes Insipidus — Diabetes Mellitus—Leukæmia.
 Polyuria, Intermittent. See Hydronephrosis.
 Pomegranate. See Pelletierine.
 Poncet's Method. See Tendons; Wounds and Injuries.
 Pons, Tumors of. See Tumors of Brain.
 Pons Varolii, Hæmorrhage into. See Alcoholism; Acute.
 Popliteal Aneurism. See Aneurism.
 Poppy, White. See Opium.
 Poppy-capsules. See Opium.
 Poppy-seed Oil. See Opium.
 Pork. See Parasites; Trichina.
 Pork Tape-worm. See Parasites; Tape-worms; Tænia Solium.
 Pork-pie Poisoning. See Toxic Foods; Meat Poisoning.
 Porphyroxin. See Opium.
 Port Wine. See Alcohol.
 Port-Wine Mark. See Wounds of Head; Tumors of Scalp.
 Portal Cirrhosis. See Cirrhosis of the Liver.
 Portal Cirrhosis with Adenomatous or Adenocarcinomatous Overgrowth. See Cirrhosis of Liver; Portal.
 Portal Cirrhosis with Pigmentation. See Cirrhosis of the Liver; Portal.
 Portal Cirrhosis with Secondary Parenchymatous Hypertrophy. See Cirrhosis of Liver; Portal.
 Portal Congestion. See Podophyllum.
 Portal Thrombosis. See Cirrhosis of the Liver; Portal.
 Porter. See Malt.
 Post-apoplectic Insanity. See Insanity.
 Posterior Linear Proctotomy. See Tumors of Rectum and Anus; Malignant Growths.
 Posterior Spinal Sclerosis. See Locomotor Ataxia.
 Post-febrile Insanity. See Insanity.
 Post-febrile Neuritis. See Nerves, Peripheral; Multiple Neuritis.
 Post-hemiplegic Chorea. See Chorea, Post-hemiplegic (Index).
 Posthitis. See Penis and Testicles; Inflammatory Affections.

- Post-mortem Coagula. See Vascular System; Vascular Obstruction; Thrombosis.
- Post-mortem Wart. See Surgical Diseases of the Skin and its Appendages; Verruca.
- Post-nasal Adenoid Growths. See Naso-pharynx.
- Post-nasal Catarrh. See Naso-pharynx; Chronic Naso-pharyngitis.
- Post-operative Insanity. See Insanity.
- Post-operative Obstruction. See Obstruction, Intestinal.
- Post-partum Hæmorrhage. See Ipecac; Hæmorrhage — Nux Vomica; Uterine Disorders — Sodium; Gynæcological Disorders.
- Post-typhoid Insanity. See Typhoid Fever; Complications.
- Potash. See Potassium.
- Potash, Permanganate of. See Manganese—Potassium.
- Potash, Sulphated. See Sulphur.
- Potassa. See Potassium.
- Potassa Sulphurata. See Sulphur.
- POTASSIUM (*General Subject*).
- Potassium-Bromide Eruption. See Dermatitis Medicamentosa.
- Potassium Chlorate. See Hæmoglobinuria.
- Potassium Iodide. See Laryngitis; Œdema—Syphilis.
- Potassium-Iodide Eruption. See Dermatitis Medicamentosa.
- Potassium Permanganate. See Manganese—Opium; Acute Poisoning—Phosphorus; Poisoning.
- Potassium Poisoning. See Potassium.
- Potato Poisoning, Sprouting. See Toxic Foods; Grain Poisoning.
- Pott's Disease. See Mediastinum; Abscess—Meningitis; Spinal—Spine, Diseases of; Tuberculosis.
- Pott's Fracture. See Fractures of Leg.
- Poultice. See Olive-oil.
- Poultice, Flaxseed. See Linum.
- Poultice, Hop. See Lupulus.
- Poultice, Jacket. See Linum — Pneumonia, Catarrhal.
- Poultice, Peppermint. See Mentha.
- Præcordial Pain. See Valvular Diseases of Heart; Acute Endocarditis.
- Præputial Orifice, Obliteration of. See Penis and Testicles.
- Præputial Orifice, Occlusion of. See Penis and Testicles.
- Precipitated Chalk. See Calcium.
- Precipitated Sulphur. See Sulphur.
- Precocious Syphilides. See Syphilis; General Infection.
- Præcordial Distress. See Surgical Diseases; Traumatic Delirium.
- Pregnancy. See Albuminuria — Amenorrhœa — Bright's Disease; Acute — Colocynth; Gastro-Intestinal Disorders — Goitre—Influenza—Liver; Acute Yellow Atrophy—Nursing; Breast-milk—Peritoneum; Ascites—Peritoneum; Tuberculous Peritonitis—Uterine Adnexa; Tumors of Ovaries — Uterus; Myoma.
- PREGNANCY, DISORDERS OF (*General Subject*).
- See Abortion.
- Pregnancy, Eruption during. See Dermatitis Herpetiformis.
- Pregnancy, Extra-uterine. See Appendicitis—Peritoneum; Acute Peritonitis — Pregnancy, Disorders of.
- Pregnancy, Glycosuria in. See Diabetes Mellitus.
- Pregnancy, Insanity of. See Insanity; Catatonia.
- Pregnancy, Multiple. See Parturition, Abnormal.
- Pregnancy, Spurious. See Pregnancy, Disorders of.
- Pregnancy, Vomiting of. See Arsenic—Belladonna; Gastro-Intestinal Disorders — Chloral — Hydrocyanic Acid; Spasmodic Disorders—Ipecac—Menthol; Gastro-Intestinal Disorders—Silver; Gynæcology.
- Prepared Chalk. See Calcium.
- Prepuce, Adherent. See Penis and Testicles; Anomalies.
- Prepuce, Herpes of. See Herpes Genitalis.
- Prepuce, Syphilitic Vegetations of. See Iron; Local Uses.
- Presbyopia. See Hyperopia.
- Pressure Probe, Fowler's. See Wounds of Head; Gunshot Wounds.
- Presystolic Murmur. See Murmur, Presystolic (Index).
- Priapism. See Gold; Poisoning—Juniper; Poisoning—Lupulus; Genito-Urinary Irritation—Penis and Testicles; Phimosi — Spinal Cord; Myelitis — Urinary System, Surgical Diseases of; Hypertrophy of Prostate — Urinary System, Surgical Diseases of; Vesical Calculus.
- Prickly Heat. See Miliaria.
- Priestley Smith's Method. See Strabismus.
- Primary Contracted Kidney. See Bright's Disease; Non-exudative Chronic.
- Primary Lateral Sclerosis. See Spinal Cord; Amyotrophic Sclerosis.
- Primary Wound Fever. See Surgical Diseases; Traumatic Fever.
- Primrose Eruption. See Erythema Medicamentosum.
- Prisms. See Strabismus.
- Probe, Fowler's Pressure. See Wounds of Head; Gunshot Wounds.
- Probe, Girdner's Telephone. See Wounds of Head; Gunshot Wounds.
- Procidencia of Uterus. See Uterus; Prolapse.
- Procidencia Recti. See Rectum and Anus; Prolapse of Rectum.
- Proctotomy, Posterior Linear. See Tumors of Rectum and Anus; Malignant Growths.
- Procursive Chorea. See Chorea; Anomalous Varieties.
- Progressive Bulbar Paralysis. See Tumors of Brain; Tumors of Medulla.
- Progressive Lead Palsy. See Strychnine; Nervous Disorders.
- Progressive Muscular Atrophy. See Alcoholic Neuritis—Spinal Cord; Syringomyelia.
- Progressive Muscular Atrophy of Déjerine-Landouzy. See Muscles.
- Progressive Muscular Atrophy of Youth and Adult Life. See Muscles.
- Progressive Muscular Dystrophy of Infants. See Muscles.
- Progressive Ossifying Myositis. See Muscles.
- Progressive Spastic Ataxia. See Ataxia, Progressive Spastic (Index).
- Progressive Spinal Muscular Atrophy. See Spinal Cord; Amyotrophic Sclerosis.
- Prolapse of Bowel. See Bowel, Prolapse of (Index).
- Prolapse of Fallopian Tubes. See Uterine Adnexa; Displacements of Ovary.
- Prolapse of Ovary. See Uterine Adnexa; Displacements of Ovary.
- Prolapse of Rectum. See Rectum, Prolapse of (Index).
- Prolapse of Rectum, König's Operation for. See Rectum and Anus; Prolapse of Rectum.
- Prolapse of Uterus. See Uterus, Prolapse of (Index).
- Prolapse of Vagina. See Vagina, Prolapse of (Index).
- Prolapsus Recti. See Rectum and Anus; Prolapse of Rectum—Rectum, Prolapse of (Index).
- Proliferating Retinitis. See Optic Nerve and Retina; Retinitis.
- Prominence of Eyeball. See Exophthalmic Goitre—Vascular Diseases of Brain; Thrombosis of Sinuses.
- Pronated Foot. See Orthopædic Surgery; Pes Planus.
- Properitoneal Hernia. See Hernia; Rare Forms.
- Prostate, Abscess of. See Abscess of Prostate (Index).
- Prostate, Anomalies of. See Urinary System, Surgical Diseases of Prostate.
- Prostate, Carcinoma of. See Urinary System, Surgical Diseases of; Tumors of Prostate.
- Prostate, Chronic Inflammation of. See Cubeb; Catarrhal Disorders.
- Prostate, Cysts of. See Urinary System, Surgical Diseases of; Tumors of Prostate.
- Prostate, Diseases of. See Urinary System, Surgical Diseases of.
- Prostate, Enlarged. See Creasote; Cystitis.
- Prostate, Foreign Bodies in. See Urinary System, Surgical Diseases of.
- Prostate, Hypertrophy of. See Urinary System, Surgical Diseases of—Urinary System, Surgical Diseases of; Chronic Prostatitis.
- Prostate, Sarcoma of. See Urinary System, Surgical Diseases of; Tumors of Prostate.
- Prostate, Tuberculosis of. See Urinary System, Surgical Diseases of.
- Prostate, Tumors of. See Urinary System, Surgical Diseases of; Tuberculosis of Prostate — Urinary

- Prostate, Tumors of.
System, Surgical Diseases of; Tumors of Prostate.
- Prostate, Wounds of. See Urinary System, Surgical Diseases of; Prostate.
- Prostatectomy. See Urinary System, Surgical Diseases of; Hypertrophy of Prostate.
- Prostatic Calculi. See Urinary System, Surgical Diseases of.
- Prostatic Plexus, Phlebitis of. See Urinary System, Surgical Diseases of; Wounds of Prostate.
- Prostatic Urethra, Polyps of. See Urinary System, Surgical Diseases of.
- Prostatitis. See Ichthyol; Genito-Urinary Disorders — Urinary System, Surgical Diseases of; Hypertrophy of Prostate.
- Prostatorrhœa. See Juniper; Genito-Urinary Disorders — Urinary System, Surgical Diseases of.
- Prostration. See Syphilis: General Infection—Toxic Foods; Grain Poisoning — Vasculo-Cardiac Neuroses: Slow Heart — Wounds (Septic) and Gangrene; Sapræmia — Wounds (Septic) and Gangrene; Septicæmia—Zinc; Poisoning.
- Prostration, Muscular. See Muscular Prostration (Index).
- Protargol. See Silver; Unofficial Salts — Urinary System, Surgical Diseases of; Gonorrhœa.
- Protective. See Adhesol—Bismuth—Petroleum.
- Protonuclein. See Anæmia, Pernicious.
- Protropine. See Opium.
- Protoplasm, Effect of Alcohol upon. See Alcoholism; Chronic.
- Protoxide of Nitrogen. See Nitrous Oxide.
- Prune-juice Sputum. See Sputum, Prune-juice (Index).
- Prurigo. See Arsenic; Skin Diseases—Belladonna; Cutaneous Disorders — Gout—Ichthyol — Pix Liquida; Cutaneous Disorders — Salophen—Silver; Cutaneous Disorders — Sulphur; Cutaneous Disorders.
- Prurigo Senilis. See Creasote; Skin Diseases.
- Pruritus. See Bright's Disease; Non-exudative Chronic—Cannabis Indica; Skin Diseases—Chloral; Skin Diseases—Diabetes Mellitus—Eczema — Grindelia — Herpes Genitalis — Hydrocyanic Acid; Cutaneous Disorders — Ichthyol; Cutaneous Disorders—Iodine; Iodoform; Untoward Effects — Itching (Index) — Jaborandi; Cutaneous Disorders — Jaundice; Obstructive—Leukæmia—Menthol; Painful Disorders — Miliaria — Orthoform; Physiological Action—Pemphigus—Phenic (Carbolic) Acid; Cutaneous Disorders—Salicylic Acid; Poisoning — Salophen — Scleroderma — Scabies—Sodium; Cutaneous Disorders—Thymol — Urticaria.
- Pruritus, Anal. See Hemorrhoids — Mercury; Oxides — Parasites; Intestinal; Oxyuris — Pix Liquida; Cutaneous Disorders—Rectum and Anus — Salicylic Acid.
- Pruritus Pudendi. See Lead; External Applications — Silver; Cutaneous Disorders.
- Pruritus, Scrotal. See Ethyl-chloride; Neuralgia.
- Pruritus, Universal. See Lithium; Diabetes.
- Pruritus Vulvæ. See Salicylic Acid — Vulva, Pruritus of (Index).
- Prussic Acid. See Hydrocyanic Acid.
- Prussic-Acid Poisoning. See Glycosuria.
- Psammoma Endothelioma. See Tumors; Connective Tissue.
- Psammoma of Spinal Cord. See Spine, Diseases of; Tumors.
- Psammomata. See Tumors; Epithelial.
- Pseudarthrosis. See Fractures.
- Pseudoacromegalic Syringomyelia. See Acromegaly.
- Pseudocysts. See Tumors; Cysts.
- Pseudodiphtheria. See Nucleins—Scarlet Fever.
- Pseudoglioma. See Optic Nerve and Retina; Glioma — Optic Nerve and Retina; Retinitis.
- Pseudohypertrophic Muscular Paralysis. See Muscles.
- Pseudoleucocythæmia. See Anæmia—Anæmia, Pernicious.
- PSEUDOLEUKÆMIA (HODGKIN'S DISEASE) (*General Subject*). See Arsenic; Blood Disorders—Hodgkin's Disease (Index)—Iron—Leukæmia—Malarial Fevers.
- Pseudomembranous Croup. See Croup; Catarrhal.
- Pseudomembranous Laryngitis. See Croup; Membranous—Diphtheria; Laryngeal.
- Pseudomembranous Pharyngitis. See Measles.
- Pseudomembranous Rhinitis. See Nasal Cavities; Croupous Rhinitis.
- Pseudomorphine. See Opium.
- Pseudomuscular Hypertrophy. See Muscles; Hypertrophy.
- Pseudoparalysis. See Scorbutus, Infantile.
- Pseudopterygium. See Conjunctiva; Pterygium.
- Pseudorabies. See Rabies.
- Pseudorhabditis Stercoralis. See Parasites; Anguilla.
- Pseudosclerose en Plaques. See Sclerosis of Brain.
- Pseudoseizures. See Cerebral Hemorrhage.
- Pseudotabs Syphilitica. See Syphilis; Period of Sequelæ.
- Pseudotropine. See Hyoscyamus.
- Psos-abscess. See Hernia; Femoral.
- PSORIASIS (*General Subject*). See Animal Extracts; Thyroid—Anthrabin—Aristol; Skin Diseases—Arsenic; Skin Diseases—Cantharides; Skin Diseases—Chaulmugra-oil—Chrysarobin; Skin Diseases—Copaiba; Skin Diseases—Creasote; Skin Diseases—Eczema—Erythema Multiforme—Euphorben; Cutaneous Disorders — Formaldehyde; Cutaneous Disorders — Gout; Irregular — Hydraceticin — Iodine; Aristol — Iodine; Skin Disorders — Mercury; Nitrates—Naphthalin; Cutaneous Disorders—Petroleum; External Use—Phenic (Carbolic) Acid; Cutaneous Disorders — Phosphorus; Cutaneous Disorders—Pix Liquida; Cutaneous Disorders—Potassium; Dithiocarbonate—Pyrogallol—Resorcin—Resorcin; Resorcinol — Salicylic Acid—Salophen—Silver; Cutaneous Disorders — Strontium; Cutaneous Disorders — Sulphur; Cutaneous Disorders — Thymol—Variola; Vaccinia.
- Psoriasis of Face. See Acne Rosacea.
- Psychoses. See Influenza—Insanity—Neurasthenia.
- Psychoses, Cardiac. See Valvular Diseases of Heart; Aortic Regurgitation.
- Pterygium. See Conjunctiva.
- Ptomaine Poisoning. See Mercury; Iodides — Toxic Foods.
- Ptomaines. See Toxic Foods.
- Ptoxis. See Diphtheria — Gelsemium; Physiological Action—Hydrocephalus; Acute — Hysteria; Special Sense-organs—Insanity; Syphilitic—Locomotor Ataxia; Ocular—Muscle Palsies—Meningitis; Acute Leptomenigitis—Meningitis; Chronic Leptomenigitis — Palpebræ — Salicylic Acid; Poisoning — Sulphonal; Poisoning — Tumors of Brain; Tumors of Pons — Wounds of Head; Wounds of Brain.
- Ptoxis, Unilateral. See Neurasthenia.
- Ptyalism. See Belladonna; Gastro-Intestinal Disorders—Iodine; Iodism—Mercury; Untoward Effects—Pregnancy, Disorders of—Salivary Glands — Salivation (Index)—Tongue; Cancer—Tongue; Glossitis.
- Pubescent Insanity. See Insanity.
- Pudendal Hernia. See Hernia; Perineal.
- Puerile Cervix. See Uterus; Malformations.
- Puerile Uterus. See Uterus; Malformations.
- Puerperal Convulsions. See Convulsions, Puerperal (Index).
- Puerperal Disorders. See Sodium.
- Puerperal Eclampsia. See Eclampsia (Index).
- Puerperal Fever. See Copper; Sepsis — Creasote; Septic Diseases—Phenic (Carbolic) Acid—Phenic (Carbolic) Acid; Phenosalyl — Quinine; Inflammation — Resorcin—Silver; Unguentum Crédé—Stomach, Diseases of; Phlegmonous Gastritis — Vagina—Veratrum Viride.
- Puerperal Insanity. See Insanity; Catatonia — Insanity; Puerperal.
- Puerperal Metritis. See Metritis, Puerperal (Index).
- Puerperal Neuritis. See Nerves, Peripheral; Multiple Neuritis.
- Puerperal Sepsis. See Silver; Unguentum Crédé.
- Puerperal State. See Joints; Septic Arthritis.
- Puerperal Subinvolution. See Metritis.
- Puerperal Vaginitis. See Vagina.
- Puffball. See Toxic Foods; Edible Mushrooms.
- Puffiness about Orbit. See Vascular Diseases of Brain; Thrombosis of Sinuses.
- Pullna Spring-water. See Magnesia; Purgative.
- Pulmonary. See Lungs (Index).
- Pulmonary Abscess. See Empyema—Liver; Abscess — Pneumonia, Lobar — Pulmonary Abscess and Gangrene.

- PULMONARY ABSCESS AND GANGRENE** (*General Subject*). See *Pulmonary Abscess* (Index).
- Pulmonary Adenoma**. See *Adenoma of Lung* (Index).
- Pulmonary Apoplexy**. See *Pulmonary Circulation; Hemorrhage*.
- Pulmonary Artery, Stenosis of**. See *Myocarditis*.
- Pulmonary Atelectasis**. See *Myocarditis—Pulmonary Circulation*.
- Pulmonary Cavities**. See *Pulmonary Abscess and Gangrene—Tuberculosis of Lungs*.
- PULMONARY CIRCULATION, DISORDERS OF** (*General Subject*).
- Pulmonary Congestion**. See *Jalap—Lungs, Congestion of* (Index)—*Myocarditis—Pulmonary Circulation—Typhoid Fever—Vascular System; Vascular Obstruction; Fat-embolism*.
- Pulmonary Diseases**. See *Copaiba*.
- Pulmonary Disorders**. See *Amylene-hydrate—Strychnine*.
- Pulmonary Embolism**. See *Pulmonary Circulation; Atelectasis—Pulmonary Circulation; Embolism*.
- PULMONARY EMPHYSEMA** (*General Subject*). See *Emphysema* (Index).
- Pulmonary Engorgement**. See *Valvular Diseases of Heart; Mitral Stenosis*.
- Pulmonary Fibrosis**. See *Pulmonary Emphysema; Compensatory*.
- Pulmonary Hemorrhage**. See *Ergot; Hemorrhage—Hemoptysis* (Index)—*Hypertrophy of Heart—Iron; Pulmonary Disorders—Phosphorus; Phosphates—Plague—Pulmonary Circulation—Pulmonary Circulation; Congestion—Hamamelis; Hemorrhage—Sodium; Laryngological Disorders—Tuberculosis of Lungs—Tuberculosis of Lungs; Chronic Ulcerative Phthisis*.
- Pulmonary Infarcts**. See *Toxic Foods; Grain Poisoning*.
- Pulmonary Œdema**. See *Elatarium; Liquid Effusions—Ether; Physiological Action—Lungs, Œdema of* (Index)—*Oxygen, Inhalations—Pulmonary Circulation; Œdema—Strophanthus*.
- Pulmonary Osteoarthropathy**. See *Acromegaly*.
- Pulmonary Phthisis**. See *Tuberculosis of Larynx*.
- Pulmonary Regurgitation**. See *Valvular Diseases of Heart*.
- Pulmonary Rupture**. See *Lungs, Rupture of* (Index).
- Pulmonary Stenosis**. See *Valvular Diseases of Heart*.
- Pulmonary Tuberculosis**. See *Boric Acid—Bronchitis—Cantharides; Respiratory Maladies—Cinnamon; Antiseptic Creasote; Pulmonary Diseases—Formaldehyde; Respiratory Tract—Iodine; Aristol—Iodine; Iodoform—Iodine; Iodoform; Internal Use—Iodine; Iodoform; Inunctions—Malarial Fevers—Mentha—Menthol; Pulmonary Disorders—Mustard; Respiratory Tract—Nucleins—Petroleum—Phenic (Carbolic) Acid; Respiratory Disorders—Phthisis* (Index)—*Pneumonoconiosis—Pulmonary Circulation; Hemorrhage—Pulmonary Emphysema; Compensatory—Rectum and Anus; Fistula in Ano—Sodium; Laryngological Disorders—Strychnine; Pulmonary Disorders—Tuberculosis of Larynx—Tuberculosis of Lungs—Tumors of Larynx and Lungs; Carcinoma of Lungs—Valvular Diseases of Heart; Pulmonary Stenosis*.
- Pulmonary Tumors**. See *Tumors, Pulmonary* (Index).
- Pulmonary Valves, Insufficiency of**. See *Valvular Diseases of Heart; Aortic Regurgitation*.
- Pulsating Empyema**. See *Empyema*.
- Pulsating Exophthalmos**. See *Orbit*.
- Pulsating Pleurisy**. See *Pleurisy, Pulsating* (Index).
- Pulsating Tumors**. See *Aneurism*.
- Pulsation, Arterial**. See *Aneurism*.
- Pulsation, Epigastric**. See *Hypertrophy of Heart*.
- Pulsation of Liver, Expansile**. See *Valvular Diseases of Heart; Tricuspid Regurgitation*.
- Pulse, Capillary**. See *Valvular Diseases of Heart; Aortic Regurgitation*.
- Pulse, Centripetal Venous**. See *Valvular Diseases of Heart; Aortic Regurgitation*.
- Pulse, "Corrigan."** See *Valvular Diseases of Heart; Aortic Regurgitation*.
- Pulse, Sinus**. See *Vascular Diseases of Brain; Thrombosis of Sinuses*.
- Pulse, "Water-hammer."** See *Valvular Diseases of Heart; Aortic Regurgitation*.
- Pulsus Alternans of Traube**. See *Vasculo-Cardiac Neuroses; Irregular Heart*.
- Pulsus Bigeminus**. See *Vasculo-Cardiac Neuroses; Irregular Heart*.
- Pulsus Paradoxus**. See *Pericardium; Adhesive Pericarditis*.
- Pulsus Paradoxus of Kussmaul**. See *Vasculo-Cardiac Neuroses; Irregular Heart*.
- Pulvis Catechu Compositus**. See *Kino—Krameria*.
- Puncta Lacrymalia, Obliteration of**. See *Lacrymal Apparatus*.
- Punctate Keratitis**. See *Keratitis*.
- Punctate Retinitis**. See *Optic Nerve and Retina; Retinitis*.
- Puncture of Heart**. See *Wounds and Injuries of Thorax*.
- Puncture of Skull**. See *Skull, Puncture of* (Index).
- Punctured Wounds of Spine**. See *Spine, Diseases of; Wounds*.
- Punicine**. See *Pelletierine*.
- Pupil, Argyll-Robertson**. See *Argyll-Robertson Pupil* (Index).
- Pupillary Abnormalities**. See *Neuralgia; Migraine*.
- Pupillary Membrane, Persistent**. See *Iris; Anomalies*.
- Pupillary Reflex**. See *Hysteria; Special Sense-organs*.
- Pupillary Reflex of Wernicke, Hemipic**. See *Tumors of Brain; Tumors of Crus*.
- Pupils, Contracted**. See *Creasote; Poisoning—Guaiacal; Poisoning—Hydrocephalus—Iodine; Iodoform; Untoward Effects—Locomotor Ataxia—Meningitis; Acute Leptomenigitis—Morphinomania—Opium; Poisoning—Phenic (Carbolic) Acid; Poisoning—Physostigma; Poisoning—Toxic Foods; Muscarine Poisoning—Toxic Foods; Poisonous Mushrooms—Typhus Fever—Wounds of Head; Wounds of Brain*.
- Pupils, Dilatation of**. See *Atropine; Disorders of Eye—Atropine; Physiological Action—Belladonna Poisoning—Erythroxylon Coca; Acute Poisoning—Gelsemium; Poisoning—Grindelia; Physiological Action—Homatropine—Iodine; Iodoform; Untoward Effects—Meningitis; Leptomenigitis—Phosphorus; Poisoning—Salicylic Acid; Poisoning—Tension of Eyeball; Glaucoma—Tumors of Brain; Tumors of Pons—Turpentine; Poisoning—Uræmia—Veratrum Viride; Poisoning—Wounds of Head; Compression of Brain—Wounds of Head; Extradural Hemorrhage—Yellow Fever*.
- Pupils, Inequality of**. See *Cerebral Hemorrhage; Eye-symptoms—Meningitis; Pachymeningitis—Spinal Cord; Syringomyelia*.
- Pupils, Pin-point**. See *Locomotor Ataxia—Opium; Poisoning*.
- Purgative**. See *Aloes—Colocynth—Jalap—Magnesia—Mercury—Podophyllum—Potassium*.
- Purging**. See *Podophyllum; Poisoning—Potassium; Poisoning—Silver; Poisoning; Acute—Turpentine; Poisoning*.
- Purpura**. See *Cinchona; Poisoning—Hæmoglobinuria—Hamamelis; Hemorrhage—Iodine; Iodism—Iron; Hemorrhage—Jaundice; Obstructive—Leukæmia—Nux Vomica; Blood Disorders—Potassium; Febrifuges—Rheumatism; Acute—Scorbutus—Specific Infectious Fevers; Relapsing*.
- Purpura Hemorrhagica**. See *Ergot; Hemorrhage—Pericardium; Pericarditis—Pulmonary Circulation; Hemorrhage—Scorbutus, Infantile—Turpentine*.
- Purpura Rheumatica**. See *Strontium; Cutaneous Disorders*.
- Purpuric Exanthem**. See *Miliary Fever*.
- Purpuric Extravasations**. See *Dermatitis Medicamentosa*.
- Purpuric Fever, Malignant**. See *Meningitis; Cerebro-Spinal*.
- Purpuric Rash**. See *Rash, Purpuric* (Index).
- Purulent Conjunctivitis**. See *Conjunctiva*.
- Purulent Gastritis**. See *Stomach, Diseases of*.
- Purulent Leptomenigitis**. See *Meningitis*.
- Purulent Ophthalmia**. See *Ophthalmia, Purulent* (Index).
- Purulent Pleuritis**. See *Empyema*.
- Purulent Retinitis**. See *Optic Nerve and Retina; Retinitis*.
- Purulent Rhinitis**. See *Nasal Cavities*.
- Purulent Sputum**. See *Tuberculosis of Lungs; Chronic Ulcerative Phthisis*.
- Pus from Nose**. See *Nose, Pus from* (Index).

- Pus in Stools. See Intestines; Tumors.
 Pus in Urine. See Urine, Pus in (Index).
 Pustular Eruption. See Dermatitis Herpetiformis—
 Dermatitis Medicamentosa.
 Pustular Syphilide. See Syphilis; Syphilides.
 Pustule. See Eczema—Salicylic Acid; Poisoning—
 Syphilis; Primary Local Changes from Infection
 —Varicella; Vaccinia.
 Pustule, Malignant. See Anthrax—Mercury; Met-
 allic—Phenic (Carbolic) Acid; Surgical Disor-
 ders—Potassium; Caustics.
 Pustule of Scalp. See Strontium; Cutaneous Disor-
 ders.
 Putrescine. See Toxic Foods; Ptomaines.
 Putrid Empyema. See Empyema.
 Putrid Sore Mouth. See Mouth; Ulcerative Stoma-
 titis.
 Pyæmia. See Burns—Empyema—Erythema Scar-
 latiniforme—Fractures—Jaundice; Toxæmia—
 Joints; Septic Arthritis—Meningitis; Leptomen-
 ingitis—Parotitis, Symptomatic—Pulmonary Ab-
 scess—Pulmonary Circulation; Embolism—Qui-
 nine; Inflammation—Rheumatism; Acute—Stom-
 ach, Diseases of; Phlegmonous Gastritis—Sur-
 gical Diseases; Traumatic Delirium—Typhoid
 Fever—Urinary System, Surgical Diseases of;
 Wounds of Prostate—Uterine Adnexa; Tumors
 of Ovaries—Valvular Diseases of Heart; Acute
 Endocarditis—Vascular System; Phlebitis—Vas-
 cular System; Phlegmasia Alba Dolens—Wounds
 (Septic) and Gangrene—Wounds (Septic) and
 Gangrene; Gangrene.
 Pyæmic Arthritis. See Scarlet Fever.
 Pyæmic Nephritis. See Wounds (Septic) and Gan-
 grene; Pyæmia.
 Pyelitis. See Cystitis—Juniper; Genito-Urinary
 Diseases—Malarial Fevers; Other Septic Pro-
 cesses—Naphthalin; Urinary Disorders—Potas-
 sium; Antacids—Salol—Typhoid Fever—Urinary
 System, Diseases of—Urinary System, Diseases
 of (Surgical); Nephrotomy.
 Pyelonephritis. See Eucalyptus; Genito-Urinary
 Disorders—Malarial Fevers; Other Septic Disor-
 ders—Urinary System, Diseases of—Urinary
 System, Diseases of (Surgical); Nephrotomy.
 Pylephlebitis, Suppurative. See Liver; Abscess.
 Pylorotomy. See Stomach, Surgery of.
 Pyloric Cramp. See Stomach, Diseases of; Carci-
 noma.
 Pyloric Hypertrophy. See Stomach, Diseases of;
 Carcinoma.
 Pyloric Stenosis, Loretta's Operation for. See Stom-
 ach; Surgery of; Gastrotoomy.
 Pyloroplasty. See Stomach; Surgery of—Stomach;
 Surgery of; Ulcer.
 Pylorospasm. See Stomach, Diseases of; Functional
 Diseases.
 Pylorus, Carcinoma of. See Cholelithiasis—Ery-
 throxyton Coca—Stomach, Diseases of; Carci-
 noma—Stomach; Surgery of; Pylorotomy.
 Pylorus, Growths of. See Urinary System, Diseases
 of (Surgical); Movable Kidney.
 Pylorus, Incontinence of. See Stomach, Diseases
 of; Functional Diseases.
 Pylorus, Obstruction of. See Pylorus, Stenosis of
 (Index)—Stomach, Diseases of; Gastric Ulcer—
 Stomach; Surgery of; Gastro-enterostomy.
 Pylorus, Stenosis of. See Stomach, Diseases of;
 Carcinoma of—Stomach, Diseases of; Dilatation
 —Stomach; Surgery of; Gastro-enterostomy—
 Stomach; Surgery of; Gastroplication.
 Pylorus, Stenosis of, Non-malignant. See Stomach;
 Surgery of; Pyloroplasty.
 Pylorus, Stricture of. See Stomach, Diseases of;
 Toxic Gastritis.
 Pylorus, Tumors of. See Aneurism; Abdominal
 Aorta—Liver; Cancer of Gall-bladder.
 Pyoktanin. See Methyl-blue.
 Pyometra. See Pregnancy, Disorders of.
 Pyonephrosis. See Hydronephrosis—Peritoneum;
 Tuberculous Peritonitis—Urinary System, Dis-
 eases of—Urinary System, Diseases of (Sur-
 gical); Nephrotomy.
 Pyopneumoperihepatitis. See Liver; Acute Perihep-
 atitis.
 Pyopneumothorax. See Pleura; Pneumothorax.
 Pyopneumothorax Subphrenicus. See Liver; Acute
 Perihepatitis.
 Pyosalpinx. See Peritoneum; Tuberculous Perito-
 nitis—Uterine Adnexa; Tumors of Ovaries.
 Pyothorax. See Empyema—Pleurisy; Acute.
 Pyrazin. See Piperazin.
 Pyretin. See Pix Liquida.
 PYRIDIN (*General Subject*).
 Pyriform Swelling of Arytenoids. See Tuberculosis
 of Larynx.
 Pyrocatechin. See Addison's Disease—Guaiacol—
 Kino—Resorcin.
 Pyrocatechuic Acid. See Resorcin; Pyrocatechin.
 Pyrodin. See Hydractin.
 Pyrogallic Acid. See Hæmoglobinuria—Pyrogallol.
 Pyrogallic-Acid Eruption. See Dermatitis Vene-
 nata.
 PYROGALLOL (*General Subject*).
 Pyrogallol Poisoning. See Pyrogallol.
 Pyroligneous Acid. See Creasote—Pix Liquida.
 Pyrosis. See Belladonna; Gastro-Intestinal Disor-
 ders—Hydrochloric Acid; Gastric Disorders—
 Kino—Lead; Gastro-Intestinal Disorders—Mag-
 nesia; Antacid—Manganese; Gastric Disorders—
 Pepsin—Potassium; Antacids—Silver; Gastro-
 Intestinal Disorders—Stomach, Diseases of; Car-
 cinoma—Stomach, Diseases of; Chronic Gas-
 tritis—Stomach, Diseases of; Functional; Hyper-
 chlorhydria—Stomach, Diseases of; Gastric
 Ulcer.
 Pyrrol. See Iodine; Iodol.
 Pysometra. See Pregnancy, Disorders of.
 Pyuria. See Chyluria—Urinary System, Diseases
 of; Pyelitis.
 Quaker Button. See Nux Vomica.
 Quartan Fever. See Malarial Fevers.
 Quartan Parasite. See Malarial Fevers.
 QUASSIA (*General Subject*).
 Quassia Poisoning. See Quassia.
 Quassin. See Quassia.
 Quebrachamine. See Quebracho.
 Quebrachine. See Quebracho.
 QUEBRACHO (*General Subject*).
 Quebracho Poisoning. See Quebracho.
 Quick-silver. See Mercury.
 Quinaseptol. See Phenic (Carbolic) Acid; Diaph-
 thol.
 Quincke's Inogen Icterus. See Choluria.
 Quinetum. See Cinchona.
 Quinic Acid. See Cinchona.
 Quinicine. See Cinchona.
 Quinidamine. See Cinchona.
 Quinidine. See Cinchona.
 Quinidine Sulphate. See Alkaloids.
 Quinina. See Quinine.
 QUININE (*General Subject*). See Alkaloids—Cin-
 chona—Hæmaturia—Hæmoglobinuria—Influenza
 —Insanity; Post-operative—Internal Ear—Lic-
 orice—Malarial Fevers—Parturition, Abnormal.
 Quinine Blindness. See Optic Nerve and Retina;
 Optic Atrophy.
 Quinine Eruption. See Dermatitis Medicamento-
 sum—Erythema Medicamentosum.
 Quinoidine. See Cinchona.
 Quinol. See Resorcin; Hydroquinone.
 Quinoline. See Analgin—Cinchona—Resorcin.
 Quinolinic Acid. See Cinchona.
 Quinone. See Cinchona.
 Quinopieric Acid. See Cinchona.
 Quinotannic Acid. See Cinchona.
 Quinovic Acid. See Cinchona.
 Quinovin. See Cinchona.
 Quinquina. See Cinchona.
 Quinsy. See Salicylic Acid.
 Quionin. See Cinchona.
 Quotidian Fever. See Malarial Fevers.
 Quotidian Intermittent Fever. See Malarial Fevers.
 Quotidian Parasite. See Malarial Fevers.
 RABIES (*General Subject*). See Animal Extracts;
 Brain—Tetanus.
 Rachitis. See Iron; Scrofulosis—Nursing; Signs of
 Unsuccessful Nursing—Osseous System; Rick-
 ets—Phosphorus—Phosphorus; Phosphates—
 Rickets (Index)—Scorbutus, Infantile.
 Rachitism. See Acromegaly.
 Radius, Dislocations of. See Dislocations.
 Radius, Fractures of. See Fractures.
 Railway Spine. See Spine, Railway (Index).
 Rangoon Oil. See Petroleum.
 Rapid Heart. See Vascular-Cardiac Neuroses.
 Rash, Erythematous. See Erythematous Rash (In-
 dex).
 Rash, Measles-like. See Variola; Vaccinia.

- Rash, Nettle-. See Phenic (Carbolic) Acid; Cutaneous Disorders—Urticaria.
- Rash, Purpuric. See Meningitis; Cerebro-Spinal—Variola; Vaccinia.
- Rash, Roseola. See Variola; Vaccinia.
- Rashes. See Eruption (Index)—Toxic Foods; Meat Poisoning.
- Rashes, Vaccination-. See Variola; Vaccinia.
- Rathanine. See Krameria.
- Ray-fungus. See Actinomycosis.
- Raynaud's Disease. See Dermatitis Gangrenosa—Nerves, Peripheral; Functional Disorders—Nitrites; Nervous Disorders—Nitroglycerin; Nervous Disorders—Scleroderma—Wounds (Septic); Symmetrical Gangrene.
- Reading-bar. See Strabismus.
- Reconstructive. See Malt.
- Rectal Alimentation. See Alimentation, Rectal (Index).
- Rectal Atony. See Magnesia; Rectal Disorders.
- Rectal Catarrh, Acute. See Potassium; Chlorate.
- Rectal Crises. See Miliary Fever.
- Rectal Epithelioma. See Rectum, Epithelioma of (Index).
- Rectal Gonorrhœa. See Mercury; Chlorides.
- Rectal Hemorrhage. See Rectum, Hemorrhage of (Index).
- Rectal Injections. See Iodine—Mercury; Chlorides.
- Rectal Neuralgia. See Locomotor Ataxia; Vesical, Rectal Symptoms.
- Rectal Stricture. See Constipation—Magnesia; Rectal Disorders—Rectum and Anus; Irritable Ulcer.
- Rectal Tenesmus. See Locomotor Ataxia.
- Rectified Turpentine. See Turpentine.
- Rectitis. See Uterus; Carcinoma.
- Rectocele. See Vagina; Herniæ—Vagino-Perineal Injuries.
- Recto-Vesical Fistula. See Stomach; Surgery of; Intestines; Enterotomy.
- Rectum, Adenocarcinoma of. See Tumors of Rectum and Anus; Malignant Growths.
- Rectum, Adenomata of. See Tumors of Rectum and Anus; Benign.
- Rectum, Anæsthesia of. See Erythroxylon Coca; Topical Administration.
- RECTUM AND ANUS, DISEASES OF (*General Subject*).
- Rectum and Anus, Tumors of. See Tumors of Rectum and Anus.
- Rectum, Angioma of. See Tumors of Rectum and Anus; Benign.
- Rectum, Benign Growths of. See Tumors of Rectum and Anus; Malignant Growths.
- Rectum, Cancer of. See Magnesia; Rectal Disorders—Tumors of Rectum and Anus; Malignant Growths.
- Rectum, Cartilaginous Growths of. See Tumors of Rectum and Anus; Enchondromata.
- Rectum, Cystoma of. See Tumors of Rectum and Anus; Benign.
- Rectum, Cysts of. See Cysts of Rectum (Index).
- Rectum, Dermoid Cysts of. See Tumors of Rectum and Anus; Cystoma—Tumors of Rectum and Anus; Tereatomata of.
- Rectum, Enchondromata of. See Tumors of Rectum and Anus; Benign.
- Rectum, Epithelioma of. See Dysentery—Tumors of Rectum and Anus; Malignant Growths.
- Rectum, Fibromata of. See Tumors of Rectum and Anus; Benign.
- Rectum, Fissures of. See Rectum and Anus—Silver; Surgical Disorders.
- Rectum, Follicular Ulceration of. See Rectum and Anus—Non-malignant Ulceration.
- Rectum, Full. See Parturition, Abnormal.
- Rectum, Granular Papilloma of. See Tumors of Rectum and Anus; Papillomata.
- Rectum, Growths of. See Growths of Rectum (Index).
- Rectum, Hemorrhage of. See Hemorrhoids—Tumors of Rectum and Anus; Malignant Growths.
- Rectum, Hernia of. See Vagina; Herniæ.
- Rectum, Inflammation of. See Potassium; Chlorate.
- Rectum, König's Operation for Prolapsed. See Rectum and Anus; Prolapse of Rectum.
- Rectum, Lipoma of. See Tumors of Rectum and Anus; Benign.
- Rectum, Malignant Growths of. See Tumors of Rectum and Anus.
- Rectum, Neoplasms of. See Tumors of Rectum and Anus; Malignant Growths.
- Rectum, Papilloma of. See Tumors of Rectum and Anus; Benign.
- Rectum, Paresis of. See Meningitis; Acute Spinal Leptomenigitis—Meningitis; Spinal.
- Rectum, Prolapse of. See Hemorrhoids—Penis and Testicles; Phimosis—Rectum and Anus—Vagino-Perineal Injuries.
- Rectum, Rupture of. See Fractures of Pelvis.
- Rectum, Sarcoma of. See Tumors of Rectum and Anus; Malignant Growths.
- Rectum, Scirrhus of. See Tumors of Rectum and Anus; Malignant Growths.
- Rectum, Soft Polyp of. See Tumors of Rectum and Anus; Benign.
- Rectum, Spasmodic Conditions of. See Belladonna; Spasmodic Disorders.
- Rectum, Syphilis of. See Dysentery.
- Rectum, Tereatomata of. See Tumors of Rectum and Anus; Benign.
- Rectum, Tumors of. See Tumors of Rectum and Anus.
- Rectum, Ulcer of. See Liver; Abscess—Tumors of Rectum and Anus; Malignant Growths.
- Rectum, Ulceration of. See Rectum and Anus; Non-malignant Ulceration—Silver; Gastro-Intestinal Disorders.
- Rectum, Varicose Ulcer of. See Rectum and Anus; Non-malignant Ulceration.
- Rectum, Villous Polypus of. See Tumors of Rectum and Anus; Papillomata.
- Rectum, Villous Tumors of. See Tumors of Rectum and Anus; Papillomata.
- Recumbent Palsy. See Nerves, Peripheral; Functional Disorders.
- Recurrent Insanity. See Insanity.
- Red Atrophic Liver. See Cirrhosis of the Liver; Portal.
- Red Atrophy of the Liver. See Liver; Passive Congestion.
- Red Bark. See Cinchona.
- Red Saunders. See Sandal-wood.
- Reddish-Brown Urine. See Sulphonal; Poisoning.
- Reduction, Forcible. See Spine, Diseases of; Tuberculosis.
- Reflex of Wernicke, Hemipic Pupillary. See Tumors of Brain; Tumors of Crus.
- Regurgitation, Aortic. See Aortic Regurgitation.
- Regurgitation, Mitral. See Mitral Regurgitation (Index).
- Regurgitation of Food. See Oesophagus; Diverticula—Oesophagus; Neuroses—Oesophagus; Stricture—Stomach, Diseases of; Functional; Cardiospasm—Stomach, Diseases of; Functional Diseases.
- Regurgitation of Solid Food. See Stomach, Diseases of; Carcinoma.
- Regurgitation, Pulmonary. See Valvular Diseases of Heart; Pulmonary Regurgitation.
- Regurgitation, Tricuspid. See Tricuspid Regurgitation (Index)—Valvular Diseases of Heart; Tricuspid Regurgitation.
- Reichmann's Disease. See Stomach, Diseases of; Functional; Gastrosuccorrhœa Continua.
- Relapsing Fever. See Bright's Disease; Acute—Specific Infectious Fevers—Specific Infectious Fevers; Dengue.
- Remittent Fever. See Cinchona—Copper; Malarial Fevers—Epistaxis—Malarial Fevers—Quinine; Malaria—Specific Infectious Fevers; Dengue.
- Remittent Fever, Bilious. See Bilious Remittent Fever (Index).
- Removal of Breast. See Tumors of Breast.
- Renal. See Kidney (Index)—Nephritic (Index).
- Renal Abscess. See Abscess, Renal (Index).
- Renal Adenoma. See Adenoma of Kidney (Index).
- Renal Asthma. See Bright's Disease; Chronic.
- Renal Calculus. See Piperazin—Urinary System, Diseases of (Surgical).
- Renal Colic. See Abortion—Amyl-valerianate—Atropine—Chloroform—Gout—Locomotor Ataxia—Nitroglycerin—Piperazin—Urinary System, Diseases of; Pyelitis—Urinary System, Diseases of (Surgical)—Urinary System, Diseases of (Surgical)—Movable Kidney—Urinary System, Diseases of (Surgical); Nephrotomy; Hydatid Cysts—Urinary System, Diseases of (Surgical); Renal Calculus—Uterine Adnexa; Tumors of Ovaries.
- Renal Congestion. See Vascular System; Vascular Obstruction; Fat-embolism.

- Renal Cysts. See Urinary System, Diseases of (Surgical); Nephrectomy—Urinary System, Diseases of (Surgical); Nephrotomy.
- Renal Disease. See Tumors of Brain.
- Renal Disorders. See Methylene-blue.
- Renal Fistula. See Urinary System, Diseases of (Surgical); Nephrectomy.
- Renal Hæmorrhage. See Abdomen; Contusions—Abdomen; Penetrating Wounds—Hæmorrhage, Renal (Index)—Hamamelis; Hæmorrhage—Iron; Hæmorrhage—Paysostigma; Urinary Disorders—Valvular Diseases of Heart; Acute Endocarditis—Vascular System; Vascular Obstruction; Thrombosis.
- Renal Surgical Diseases. See Urinary System.
- Renal Tuberculosis. See Kidney, Tuberculosis of (Index).
- Renal Tumor. See Suprarenal Capsules; Tumors—Urinary System, Diseases of (Surgical); Nephrectomy.
- Resection. See Joints; Arthritis.
- Resection, Intestinal. See Stomach; Surgery of; Intestines.
- Resection of Hip. See Hip-joint Disease.
- Resection of Part of Kidney. See Urinary System, Diseases of (Surgical).
- Resection of Ribs. See Ribs, Resection of (Index).
- Resection of Skull. See Wounds of Head; Technique of Intracranial Surgery.
- Resolvent. See Calcium—Ichthyol—Iodine and Derivatives—Mercury.
- Resonance, Cracked-Pot. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
- Resonance, Whisper-. See Tuberculosis of Lungs.
- Resopyrin. See Resorcin.
- RESORCIN (*General Subject*).
- Resorcin Eruption. See Dermatitis Venenata.
- Resorcin-eucalyptol. See Resorcin.
- Resorcinol. See Resorcin.
- Resorcin-phthalein. See Resorcin.
- Resorcin-phthalin. See Resorcin.
- Resorcin-salol. See Resorcin—Salicylic Acid; Salicyl-resorcin.
- Resorcium. See Resorcin.
- Respiration, Artificial. See Artificial Respiration (Index).
- Respiration, Cheyne-Stokes. See Cheyne-Stokes Respiration (Index).
- Respiration, Paralysis of. See Creasote; Poisoning—Curara; Physiological Action—Diphtheria.
- Respiration, Paralysis of Muscles of. See Nerves, Peripheral; Multiple Neuritis.
- Respiration, Sighing. See Surgical Diseases; Traumatic Delirium—Vascular Diseases of Brain; Thrombosis.
- Respiration, Slow. See Opium; Poisoning.
- Respiration, Stertorous. See Opium; Poisoning.
- Respiration, Stridorous. See Tumors of Larynx and Lungs; Sarcoma of Lungs.
- Respiratory Centre, Paralysis of. See Physostigma; Poisoning—Veratrum Viride; Poisoning.
- Respiratory Disorders. See Sodium—Sulphur—Zinc.
- RESPIRATORY ORGANS, NEUROSES OF (*General Subject*).
- Respiratory Paralysis. See Turpentine; Poisoning.
- Respiratory Paresis. See Cerebral Hæmorrhage.
- RESPIRATORY PASSAGES, FOREIGN BODIES IN (*General Subject*).
- Respiratory Tract, Foreign Bodies in. See Pulmonary Circulation; Atelectasis—Respiratory Passages; Foreign Bodies in.
- Rest Cure, Weir Mitchell. See Hysteria—Neurasthenia.
- Retention Cysts. See Cysts, Retention (Index).
- Retention of Urine. See Urine, Retention of (Index).
- Reticular Lymphangitis. See Status Lymphaticus; Lymphangitis.
- Retina and Optic Nerve, Diseases of. See Optic Nerve and Retina.
- Retina, Detachment of. See Optic Nerve and Retina.
- Retina, Exudation in. See Iritis; Choroiditis.
- Retina, Ischemia of. See Optic Nerve and Retina; Optic Atrophy.
- Retina, Opaque Nerve-fibres in. See Iritis; Choroiditis.
- Retinal Apoplexy. See Optic Nerve and Retina; Retinitis.
- Retinal Artery, Thrombosis of Central. See Optic Nerve and Retina.
- Retinal Hæmorrhage. See Anæmia, Pernicious—Malarial Fevers; Mental Disturbances—Optic Nerve and Retina; Retinitis—Typhoid Fever.
- Retinal Vein, Thrombosis of Central. See Optic Nerve and Retina.
- Retinitis. See Bright's Disease; Non-exudative Chronic—Diabetes Mellitus—Gout—Optic Nerve and Retina.
- Retinitis, Albuminuric. See Optic Nerve and Retina; Retinitis—Uramia.
- Retinitis, Circinate. See Optic Nerve and Retina; Retinitis.
- Retinitis Pigmentosa. See Optic Nerve and Retina; Retinitis.
- Retinitis, Purulent. See Optic Nerve and Retina; Retinitis.
- Retinitis, Serous. See Optic Nerve and Retina; Retinitis.
- Retinitis, Striate. See Optic Nerve and Retina; Retinitis.
- Retinitis, Syphilitic. See Optic Nerve and Retina; Retinitis.
- Retinochoroiditis. See Iritis; Choroiditis—Malarial Fevers; Mental Disturbances.
- Retocolle. See Uterus; Prolapse.
- Retraction of Head. See Head, Retraction of (Index).
- Retraction of Nipple. See Nipple, Retracted (Index).
- Retrolbulbar Optic Neuritis. See Optic Nerve and Retina.
- Retroflexion of Uterus. See Uterus, Retroflexion of (Index).
- Retro-oesophageal Abscess. See Intubation.
- Retroperitoneal Glands, Diseased. See Suprarenal Glands; Tumors.
- Retroperitoneal Growths. See Uterine Adnexa; Tumors of Ovaries.
- Retroperitoneal Hernia. See Hernia; Varieties.
- Retroperitoneal Tumors. See Peritoneum; Tumors.
- Retropharyngeal Abscess. See Abscess, Retropharyngeal (Index).
- Retroversion of Uterus. See Uterus, Retroversion of (Index).
- Reverdin's Method of Skin-grafting. See Skin-grafting.
- Reynold's Test. See Acetonuria.
- Rhabdomyomata. See Tumors; Connective Tissue—Tumors; Myomata.
- Rhamnus Frangula. See Buckthorn.
- Rhamnus Purshiana. See Buckthorn.
- Rhatany. See Krameria.
- Rheum. See Rhubarb.
- Rheumatic Arthritis. See Joints.
- Rheumatic Contraction of Muscles. See Muscles; Contracture.
- Rheumatic Fever. See Hydracetic—Meningitis; Leptomenigitis—Rheumatism; Acute Articular.
- Rheumatic Fever, Eruptive. See Specific Infectious Fevers; Dengue.
- Rheumatic Gout. See Rheumatism; Chronic Articular.
- Rheumatic Iritis. See Iritis, Rheumatic (Index).
- Rheumatic Myalgia. See Cimicifuga.
- Rheumatic Neuritis. See Nerves, Peripheral; Multiple Neuritis.
- Rheumatic Pains. See Alcoholic Neuritis.
- Rheumatic Paralysis. See Sulphur; Respiratory Disorders.
- Rheumatic Sore Throat. See Thiol.
- Rheumatic Spondylitis. See Spine, Diseases of; Tuberculosis.
- RHEUMATISM (*General Subject*). See Acetanilid; Neuralgia—Aconite—Alphol—Ammonia—Amylvalerianate—Aneurism—Antipyrine—Asaprol—Benzanilid—Benzoic Acid—Cajuput-oil—Cannabis Indica—Chaulmugra-oil—Chloral—Chorea—Colchicum—Erythema Multiforme—Erythema Scarlatiniforme—Erythema Symptomaticum—Exalgin—Gaultheria—Guaiaac—Guaiaicol; Painful Disorders—Ichthyol—Insanity; Acute Confusional—Insanity; Post-febrile—Iodine—Jaborandi—Lithium—Lumbago (Index)—Manganese—Mentha—Menthol; Painful Disorders—Mercury; Iodides—Methylene-blue—Muscles; Torticollis—Musk—Naphthalin; Asaprol—Naphthalin; Salinaphthol—Nerves, Wounds and Injuries of—Osseous System; Osteomalacia—Phenacetin; Methacetic—Potassium; Antacids—Resorcin; Hydroquinone—Resorcin; Resorcin-salol—Salicylic Acid and the Salicylates—Salol—Salol;

- Camphorated—Salophen—Scorbutus, Infantile—Sodium; Lithæmic Disorders—Spine, Diseases of; Tumors—Strontium—Sulphur; Lithæmic Disorders—Syphilis; Infectious Secretions—Tendons; Bursitis—Valvular Diseases of Heart; Acute Endocarditis.
- Rheumatism, Acute. See *Cinicifuga*—Iron—Meningitis; Leptomeningitis—Parasites; Trichina—Phenacetin—Phenacetin; Lactophenin—Phenocoll—Quebracho; Fevers—Quinine; Antipyretic.
- Rheumatism, Acute Articular. See Anilipyrin—Bright's Disease; Acute—Oxalic Acid—Scarlet Fever.
- Rheumatism, Articular. See Silver; Unguentum *Crède*.
- Rheumatism, Chronic. See Acromegaly—Petroleum; External Use—Sulphur; Gastro-Intestinal Diseases.
- Rheumatism, Gonorrhœal. See *Copaiba*—Mercury; Chlorides—Rheumatism—Silver; Unguentum *Crède*.
- Rheumatism, Muscular. See Erythroxyton Coca; Hypodermic Administration.
- Rheumatism of Abdominal Walls. See Peritoneum; Acute Peritonitis.
- Rheumatism of Larynx. See Larynx, Rheumatism of (Index).
- Rheumatism, Polyarticular. See Iodine; Iodosalicylic Acid.
- Rheumatism, Subacute. See Phenacetin—Quinine; Antipyretics.
- Rheumatoid Arthritis. See Animal Extracts; Bone-marrow—*Cinicifuga*—Gout—Methylene-blue—Rheumatism; Chronic Articular—Sulphur; Cutaneous Disorders.
- Rheumatoid Pains. See Syphilis; General Infection.
- Rhigolene. See Petroleum.
- Rhigolum. See Petroleum.
- Rhine Wines. See Alcohol.
- Rhinitis. See Alumol; Laryngology—Aristol—Belladonna; Disorders of Air-Passages—Boracic Acid; Borax—Formaldehyde; Respiratory Tract—Hydrogen Dioxide—Iodine; Aristol—Leprosy—Nasal Cavities—Petroleum; Respiratory Tract—Potassium; Soziodiolate.
- Rhinitis, Acute. See Erythroxyton Coca and Cocaine; Topical Administration.
- Rhinitis, Atrophic. See Euphphen; Nasal Disorders—Mercury; Chlorides—Nasal Cavities—Ozone—Phenic (Carbolic) Acid; Respiratory Disorders—Syphilis; Congenital.
- Rhinitis, Atropine. See Nasal Cavities; Acute Rhinitis.
- Rhinitis, Catarrhal. See Nasal Cavities; Acute Rhinitis—Nasal Cavities; Chronic Rhinitis.
- Rhinitis, Chronic. See Cube—Ozone—Phenic (Carbolic) Acid; Respiratory Disorders—Sinuses; Ethmoiditis.
- Rhinitis, Croupous. See Nasal Cavities.
- Rhinitis, Hyperæsthetic. See Respiratory Organs.
- Rhinitis, Hypertrophic. See Acetic Acid—Chromic Acid; Air-passages—Nasal Cavities; Chronic Rhinitis.
- Rhinitis, Iodine. See Nasal Cavities; Acute Rhinitis.
- Rhinitis, Membranous. See Nasal Cavities; Croupous Rhinitis.
- Rhinitis, Pseudomembranous. See Nasal Cavities; Croupous Rhinitis.
- Rhinitis, Purulent. See Nasal Cavities.
- Rhinoliths. See Respiratory Passages; Nasal Cavities.
- Rhinophyma. See Acne Rosacea.
- Rhinoplasty. See Plastic Surgery.
- Rhinoscleroma. See Acne Rosacea.
- Rhœadine. See Opium.
- RHUBARB (*General Subject*). See Choluria—Hæmaturia—Jaundice; Obstructive—Nursing; Breast-milk—Oxaluria.
- Rhubarb and Soda. See Sodium.
- Rhumatisme Chronique Infectueu. See Rheumatism; Chronic Articular.
- Rhus-Diversiloba Eruption. See Dermatitis Venenata.
- Rhus-Toxicodendron Eruption. See Dermatitis Venenata—Ipecac; Skin Disorders—Lead—External Applications.
- Rhus-Venenata Eruption. See Dermatitis Venenata.
- Rhythmical Movements of Trunk. See Hysteria.
- Ribbon-shaped Stools. See Stools, Ribbon Shaped (Index).
- Ribs, Dislocations of. See Dislocations.
- Ribs, Fractures of. See Fractures—Wounds and Injuries of Thorax; Fractures.
- Ribs, Necrosis of. See Wounds and Injuries of Thorax; Secondary Complications.
- Ribs, Resection of. See Pleurisy; Acute—Pleurisy; Chronic.
- Rice-water Stools. See Stools, Rice-water (Index).
- Rickets. See Deaf-mutism—Hydrocephalus; Chronic—Infantile Myxœdema—Osseous System—Pseudoleukæmia—Spine, Diseases of; Tuberculosis.
- Rickets, Adolescent. See Spine, Diseases of; Scoliosis.
- Rickets, Fœtal. See Infantile Myxœdema.
- Rider's Bone. See Muscles; Ossification.
- Riga's Disease. See Mouth.
- Rigidity of Muscles. See Muscles, Rigidity of (Index).
- Rigidity of Muscles of Legs. See Tumors of Brain; Tumors of Corpus Callosum.
- Rigidity of Muscles of Mastication. See Tetanus.
- Rigidity of Muscles of Trunk. See Tumors of Brain; Tumors of Corpus Callosum.
- Rigors. See Specific Infectious Fevers; Dengue—Status Lymphaticus; Lymphangitis—Urinary System, Diseases of; Pyelitis—Urinary System, Diseases of (Surgical); Nephrotomy; Tuberculosis—Muscular System; Phlebitis.
- Ringworm. See Cantharides; Skin Diseases—Chaulmugra-oil—Copper; Skin Diseases—Eczema—Formaldehyde; Cutaneous Disorders—Naphthalin; Naphthol—Silver; Cutaneous Disorders—Thymol.
- Ringworm of Scalp. See Resorcin.
- Rinne's Test. See Internal Ear.
- Risus Sardonius. See Nux Vomica; Poisoning—Strychnine; Poisoning.
- Riziform Bodies. See Tendons; Bursitis—Tendons; Tenosynovitis.
- Riziform Bodies in Joints. See Joints; Loose Bodies in.
- Riziform Stools. See Cholera Asiatica.
- Roberts's Test. See Albuminuria.
- Rochelle Salt. See Potassium—Sodium.
- Rock-oil. See Petroleum.
- Rodent Cancer. See Tuberculosis of Skin; Lupus Vulgaris.
- Rodent Ulcer. See Ulcer, Rodent (Index).
- Rodent Ulcer of Rectum. See Rectum and Anus; Non-malignant Ulceration.
- Roentgen-Ray Dermatitis. See Dermatitis Traumatica.
- Roentgen Rays. See Tuberculosis of Lungs—Tuberculosis of Skin; Lupus Vulgaris—Vascular System; Arteriosclerosis—Wounds of Head; Gun-shot Wounds—X-rays (Index).
- Rolandic Region, Tumors of. See Tumors of Brain.
- Roman Fever. See Malarial Fevers; Synonyms.
- Romberg's Symptom. See Locomotor Ataxia.
- Roosa's Modification of Rinne's Test. See Internal Ear.
- Rosacea. See Eczema—Euphphen; Wounds—Ichthyol; Cutaneous Disorders.
- Rose Cold. See Respiratory Organs; Hyperæsthetic Rhinitis.
- Rose-Colored Eruption. See Valvular Diseases of Heart; Acute Endocarditis.
- Rose-Colored Spots. See Syphilis; General Infection—Typhoid Fever.
- Rosenbach, "Erysipeloid" of. See Status Lymphaticus; Lymphangitis.
- Roseola. See Cinchona; Poisoning—Rheumatism; Acute—Specific Infectious Fevers; Relapsing.
- Roseola Rash. See Variola; Vaccinia.
- Roseola Scarlatiniforme. See Erythema Scarlatiniforme.
- Roseola Simplex. See Rubella.
- Roseola, Syphilitic. See Syphilis; General Infection.
- Rotary Lateral Curvature. See Spine, Diseases of; Scoliosis.
- Rötheln. See Measles—Rubella.
- Roughness of Skin. See Toxic Foods; Grain Poisoning.
- Round Ligament, Fibroma of. See Vagina; Tumors of Vulva.
- Round Ligament, Hydrocele of. See Vagina; Tumors of Vulva.

- Round Worms. See Parasites; Intestinal—Salicylic Acid.
- Rubefacient. See Ammonia—Cajuput-oil—Camphor—Chloroform—Iodine and Derivatives—Mace—Mustard.
- RUBELLA (*General Subject*).
- Rubeola. See Measles—Rheumatism; Acute—Vari-cella—Variola.
- Rubcola, Malignant. See Typhus Fever.
- Rubeola Notha. See Rubella.
- Rubeolar Exanthem. See Miliary Fever.
- Rubeolous Eruption. See Pix Liquida; Poisoning.
- Rubidium Iodide. See Iodine.
- Rudimentary Uterus. See Uterus; Malformations.
- Rum. See Alcohol.
- Rumination. See Neurasthenia—Stomach, Diseases of; Functional Diseases.
- "Run-around." See Nails; Onychia.
- Rupia. Syphilitic. See Syphilis; Syphilides.
- Rupture. See Hernia.
- Rupture of Arteries. See Vascular System; Injuries of Arteries; Contusion.
- Rupture of Bladder. See Bladder, Rupture of (Index).
- Rupture of Cardiac Wall. See Vascular System; Arteriosclerosis.
- Rupture of Cystic Tumors. See Uterine Adnexa; Tumors of Ovaries.
- Rupture of Ectopic Gestation. See Uterine Adnexa; Tumors of Ovaries.
- Rupture of Gall-bladder. See Gall-bladder, Rupture of (Index).
- Rupture of Heart. See Heart, Rupture of (Index).
- Rupture of Lung. See Lung, Rupture of (Index).
- Rupture of Pericardium. See Pericardium, Rupture of (Index).
- Rupture of Pleura. See Wounds and Injuries of Thorax; Fractures.
- Rupture of Tendon. See Tendons; Wounds and Injuries.
- Rupture of Urethra. See Urethra, Rupture of (Index).
- Rupture, Perineal. See Vagino-Perineal Injuries.
- Rusty Sputum. See Sputum, Rusty (Index).
- Rydygier's Incision. See Wounds and Injuries of Thorax; Suture of Heart.
- Rye, Spurred. See Ergot.
- Saccharin. See Diabetes Mellitus—Phenacetin; Dul-cin.
- Saccharin Diabetes. See Diabetes Mellitus—Wounds of Head; Wounds of Brain.
- Saccharomyces Albicans. See Mouth; Parasitic Stomatitis.
- Saccharose in Urine. See Glycosuria.
- Sacro-Iliac Joint Disease. See Hip-joint Disease—Spine, Diseases of.
- Sacrum, Fracture of. See Fractures.
- Saddle-nose. See Leprosy.
- Sacmisch Incision. See Keratitis.
- "Sago" Spleen. See Spleen; Lardaceous Disease.
- Sal Ammoniac. See Ammonium.
- Sal Prunella. See Potassium.
- Sal Rochelle. See Potassium.
- Salaam Convulsions. See Spasms in Children; Automatic Movements.
- Salacetol. See Salicylic Acid.
- Salactol. See Salicylic Acid.
- Salaktol. See Salicylic Acid; Salactol.
- Salazolol. See Salicylic Acid; Antipyrine Salic-ylate.
- Salbromalid. See Salicylic Acid; Salicylbromanilid.
- Salicyl-acetic Acid. See Salicylic Acid.
- Salicyl-acetol. See Salicylic Acid; Salacetol.
- Salicylamid. See Salicylic Acid.
- Salicylate Eruption. See Erythema Scarlatiniforme.
- Salicylate of Methyl. See Rheumatism.
- Salicylate of Sodium. See Rheumatism.
- Salicylates. See Nursing; Breast-milk.
- Salicylates, Poisoning. See Glycosuria.
- Salicylbromanilid. See Salicylic Acid.
- SALICYLIC ACID (*General Subject*). See Alphen—Bright's Disease; Acute—Hæmaturia—Internal Ear—Iodine; Iodosalicylic Acid—Naphthalin; Salinaphthol—Phenic (Carbolic) Acid; Pheno-salyl—Rheumatism—Salol—Salophen.
- Salicylic-Acid Eruption. See Dermatitis Venenata—Erythema Medicamentosum.
- Salicylic Aldehyde. See Salicylic Acid.
- Salicylidene Paraphenetidin. See Salicylic Acid; Salicyl-paraphenetidin.
- Salicylous Acid. See Salicylic Acid; Salicylic Alde-hyde.
- Salicyl-paraphenetidin. See Salicylic Acid.
- Salicyl-resorcin. See Salicylic Acid.
- Salicyl-sulphuric Acid. See Salicylic Acid.
- Salinaphthol. See Naphthalin—Salicylic Acid; Naphthol Salicylate.
- Saline Cathartics. See Nursing; Breast-milk.
- Saline Infusions. See Anæmia—Chloroform—Chol-era Asiatica—Cholera Infantum—Infants, Diar-rheal Diseases of—Insanity—Obstruction, Intes-tinal—Pneumonia, Lobar—Shock.
- Saline Irrigation. See Eclampsia.
- Saline Solution. See Abortion.
- Saline Solution, Injection of. See Wounds (Septic) and Gangrene; Septicæmia.
- Salipyrine. See Salicylic Acid; Antipyrine Salic-ylate.
- Salithymol. See Salicylic Acid; Thymol Salicylate.
- Saliva, Checking Secretion of. See Camphor.
- Saliva, Excessive Flow of. See Belladonna—Mer-cury; Untoward Effects.
- Salivary Calculus. See Salivary Glands.
- Salivary Glands, Cysts of. See Salivary Glands; Tumors.
- SALIVARY GLANDS, DISEASES OF (*General Subject*).
- Salivary Glands, Tumors of. See Salivary Glands.
- Salivation. See Gold; Poisoning—Guaiacol; Poison-ing—Jaborandi; Poisoning—Mercury; Poisoning—Pregnancy, Disorders of—Ptyalism (Index)—Quebracho; Poisoning—Resorcin; Poisoning—Salivary Glands; Ptyalism—Specific Infectious Fevers; Dengue—Stomach, Diseases of; Acute Gastritis—Stomach, Diseases of; Toxic Gastritis—Toxic Foods; Muscarine Poisoning.
- Salivation, Bloody. See Nitric Acid; Poisoning.
- Salmon Poisoning, Salted. See Toxic Foods; Shell-fish Poisoning.
- Salmond's Operation. See Hæmorrhoids.
- Salocoll. See Phenocoll—Salicylic Acid; Phenocoll Salicylate.
- SALOL (*General Subject*). See Salicylic Acid—Salo-phen.
- Salol Eruption. See Erythema Medicamentosum.
- SALOPHEN (*General Subject*). See Rheumatism—Salicylic Acid; Amidophenol Salicylate.
- Salpingitis. See Appendicitis—Metritis—Urinary System, Surgical Diseases of; Gonorrhœa in Women.
- Salpingitis Nodosa. See Uterine Adnexa; Tumors of Fallopian Tubes.
- Salt, Common. See Sodium.
- Salt of Sorrel. See Oxalic Acid.
- Salt, Sea-. See Sodium.
- Salt-Solution Infusion. See Anæmia.
- Salt, Table-. See Sodium.
- Saltatory Spasm. See Chorea.
- Salted-Salmon Poisoning. See Toxic Foods; Shell-fish Poisoning.
- Salted-Sturgeon Poisoning. See Toxic Foods; Shell-fish Poisoning.
- Saltpeter. See Potassium—Sodium.
- Saltpeter, Chilean. See Iodine.
- Saltpeter, Chili. See Sodium.
- Salum. See Salicylic Acid; Aluminium Salicylate.
- Sanarelli, Bacillus Icteroides of. See Yellow Fer-ver.
- Sanatoria. See Leprosy—Tuberculosis of Lungs.
- SANDAL-WOOD AND OIL OF SANDAL-WOOD (*Gen-eral Subject*).
- Sand-fly. See Wounds and Stings.
- Sandiford Spring-water. See Gout.
- Sanitarium Treatment. See Tuberculosis of Lungs.
- Santal, Oil of. See Sandal-wood.
- Santalic Acid. See Sandal-wood.
- Santalin. See Sandal-wood.
- Santalum Rubrum. See Sandal-wood.
- Santonin. See Choluria—Jaundice; Obstructive—Parasites; Intestinal; Ascariis.
- Santonin in Urine. See Hæmaturia.
- Sapramia. See Quinine; Inflammation—Wounds (Septic) and Gangrene; Septicæmia.
- Saprol. See Phenic (Carbolic) Acid; Phenosalyl.
- Sarcina Ventriculi. See Stomach, Diseases of; Dilatation.
- Sarcoma. See Actinomycosis—Arsenic; Tumors—Erysipelas—Fractures—Leukæmia—Ozone—Pseudoleukæmia—Scorbutus, Infantile—Tumors.
- Sarcoma, Giant Celled. See Tumors.
- Sarcoma, Melanotic. See Tumors; Connective Tis-sue.

- Sarcoma, Myeloid. See Tumors; Connective Tissue.
 Sarcoma, Nasal. See Nasal Cavities; Tumors.
 Sarcoma of Breast. See Tumors of Breast.
 Sarcoma of Cervix. See Uterus; Sarcoma.
 Sarcoma of Choroid. See Iris, Ciliary Body, and Choroid; Sarcoma.
 Sarcoma of Ciliary Body. See Iris, Ciliary Body, and Choroid; Sarcoma.
 Sarcoma of Clitoris. See Clitoritis.
 Sarcoma of Conjunctiva. See Conjunctiva; Tumors.
 Sarcoma of Cornea. See Cornea; Tumors.
 Sarcoma of Endometrium. See Uterus; Sarcoma.
 Sarcoma of Eyelids. See Palpebræ; Tumors.
 Sarcoma of Fallopian Tubes. See Uterine Adnexa; Tumors of Fallopian Tubes.
 Sarcoma of Femur. See Hip-joint Disease.
 Sarcoma of Gums. See Jaws; Epulis.
 Sarcoma of Heart. See Mediastinum; Tumors.
 Sarcoma of Ilium. See Hip-joint Disease.
 Sarcoma of Intestines. See Intestines; Tumors.
 Sarcoma of Kidney. See Urinary System, Diseases of (Surgical); Tumors of Kidney.
 Sarcoma of Larynx. See Tumors of Larynx and Lungs; Malignant Tumors of Larynx.
 Sarcoma of Liver. See Liver; Tumors.
 Sarcoma of Lung. See Tumors of Larynx and Lungs; Lungs.
 Sarcoma of Lymphatic Glands. See Status Lymphaticus.
 Sarcoma of Maxillary Gland. See Salivary Glands; Tumors.
 Sarcoma of Naso-pharynx. See Naso-pharynx; Tumors.
 Sarcoma of Ovary. See Ovary, Sarcoma of (Index).
 Sarcoma of Pancreas. See Pancreas; Tumors.
 Sarcoma of Parotid Glands. See Salivary Glands; Tumors.
 Sarcoma of Penis. See Penis and Testicles; Tumors.
 Sarcoma of Peritoneum. See Peritoneum; Tumors.
 Sarcoma of Pharynx. See Tonsils; Tumors.
 Sarcoma of Pleura. See Pleura; New Growths.
 Sarcoma of Prostate. See Urinary System, Surgical Diseases of; Tumors of Prostate.
 Sarcoma of Rectum. See Tumors of Rectum and Anus; Malignant Growths.
 Sarcoma of Skull. See Wounds of Head; Tumors of Skull.
 Sarcoma of Spinal Cord. See Spine, Diseases of; Tumors.
 Sarcoma of Spleen. See Spleen; Tumors.
 Sarcoma of Testicles. See Penis and Testicles; Tumors of Testicle.
 Sarcoma of Thyroid Gland. See Thyroid Gland; Sarcoma (Index).
 Sarcoma of Tongue. See Tongue; Tumors of.
 Sarcoma of Uterus. See Uterus, Sarcoma of (Index).
 Sarcoma of Uveal Tract. See Iris; Sarcoma.
 Sarcoma of Vagina. See Vagina; Malignant Growths.
 Sarcoma of Vulva. See Vagina; Tumors of Vulva.
 Sarcoma, Orbital. See Orbit; Tumors.
 Sarcoma, Spindle Celled. See Tumors; Connective Tissue.
 Sarcoma, Telangiectatic. See Tumors.
 Sarcomatous Tumors of Pelvis. See Syphilis; Period of Sequelæ.
 Saturnine Insanity. See Insanity.
 Saturnine Neuritis. See Nerves, Peripheral; Multiple Neuritis.
 Saturnine Toxæmia. See Lead; Chronic Poisoning.
 Saturnism. See Lead; Chronic Poisoning.
 Satyrasis, Paroxysmal. See Locomotor Ataxia; Vesical and Sexual Symptoms.
 Sausage Poisoning. See Toxic Foods; Meat Poisoning.
 Sayre's Dressing. See Fractures.
 Sayre's Long Hip-splint. See Hip-joint Disease.
 SCABIES (*General Subject*). See Benzoin—Chamoille—Chaulmugra-oil—Copper; Skin Diseases—Crasote; Skin Diseases—Eczema—Pix Liquida; Cutaneous Disorders—Menthol; Painful Disorders—Naphthalin; Cutaneous Disorders—Petroleum; External Use—Phenic (Carbolic) Acid; Cutaneous Disorders—Potassium; Sozoiodolate—Rectum and Anus; Pruritus Ani—Resorcin; Resorcinol—Sodium; Cutaneous Disorders—Sulphur; Cutaneous Disorders.
 Scalds. See Euphorin; Cutaneous Disorders—Iodine; Aristol—Lead; External Applications—Picric Acid—Potassium; Sozoiodolate—Sodium; Cutaneous Disorders.
 Scalp, Abscess of. See Abscess of Scalp (Index).
 Scalp and Skull, Surgery of. See Wounds and Injuries of the Head.
 Scalp, Capillary Varix of. See Wounds of Head; Tumors of Scalp.
 Scalp, Contusions of. See Wounds of Head; Contusions of Scalp.
 Scalp, Cysts of. See Wounds of Head; Tumors of Scalp.
 Scalp, Diseases of. See Wounds of Head.
 Scalp, Erectile Tumor of. See Wounds of Head; Tumors of Scalp.
 Scalp, Erysipelatous Inflammation of. See Wounds of Head; Abscess of Scalp.
 Scalp, Fatty Tumors of. See Wounds of Head; Tumors of Scalp.
 Scalp, Fibromata of. See Wounds of Head; Tumors of Scalp.
 Scalp, Hæmorrhage under. See Wounds of Head; Contusions of Scalp—Wounds of Head; Tumors of Scalp; Cephalhæmatoma.
 Scalp, Horns of. See Wounds of Head; Tumors of Scalp.
 Scalp, Moles of. See Wounds of Head; Tumors of Scalp.
 Scalp, Nævus of. See Wounds of Head; Tumors of Scalp.
 Scalp, Oedema of. See Wounds of Head; Abscess of Scalp.
 Scalp, Pneumatocele of. See Wounds of Head; Tumors of Scalp.
 Scalp, Pustules of. See Strontium; Cutaneous Disorders.
 Scalp, Sebaceous Tumor of. See Wounds of Head; Tumors of Scalp.
 Scalp, Tumors of. See Tumors of Scalp (Index).
 Scalp, Vascular Growth of. See Wounds of Head; Tumors of Scalp.
 Scalp, Warts of. See Wounds of Head; Tumors of Scalp.
 Scalp, Wounds of. See Wounds of Head; Scalp.
 Scalp Eruption. See Psoriasis—Syphilis.
 Scaly Skin Diseases. See Sulphur; Cutaneous Disorders.
 Scanning Speech. See Speech, Scanning (Index).
 Scapula, Fracture of. See Fractures.
 Scarification. See Acne Rosacea—Erysipelas.
 Scarification of Laryngeal Tumefaction. See Laryngitis; Oedema.
 Scarlatina. See Antipyrine—Benzoic Acid—Coffee; Caffeine—Erythema Scarlatiniforme—Hæmaturia—Internal Ear—Jaundice; Toxæmia—Mangrove; External Uses—Middle Ear—Mouth; Gangrenous Stomatitis—Olive-oil—Phenacetin; Lactophenin—Phosphorus; Febrile Disorders—Quinine; Tonic—Resorcin—Rheumatism; Acute—Scarlet Fever (Index)—Varicella.
 Scarlatinal Neuritis. See Nerves, Peripheral; Multiple Neuritis.
 Scarlatinal Sore Throat. See Potassium; Chlorate.
 Scarlatiniform Eruption. See Iodine; Iodoform—Mercury; Untoward Effects.
 Scarlatiniform Erythema. See Salol; Poisoning.
 Scarlatiniform Exanthem. See Miliary Fever.
 SCARLET FEVER (*General Subject*). See Abortion—Chloral—Cinchona—Dermatitis Medicamentosa—Diphtheria—Hydrocephalus; Acute—Hydrochloric Acid—Infants, Diarrhœal Diseases of; Inflammatory Diarrhœas—Laryngitis; Symptomatic—Mercury; Iodides—Nucleins—Osseous System; Periostritis—Ozone—Parotitis; Infectious—Parotitis; Symptomatic—Pericardium; Pericarditis—Phenacetin; Methacetin—Potassium; Febrifuges—Rubella—Salicylic Acid; Sodium Borosalicylate—Scarlatina (Index)—Specific Infectious Fevers; Dengue.
 Scarlet Rash. See Scarlet Fever.
 Scars, Hypertrophied. See Surgical Diseases of the Skin and its Appendages; Cicatricial Tumors.
 Scars, Malignant Degeneration of. See Surgical Diseases of the Skin and its Appendages.
 Schede's Operation. See Empyema.
 Scheele's Green. See Arsenic—Copper.
 Schetelig's Method in Pulmonary Tuberculosis. See Guaiacal; Tuberculosis.
 Schizomycetes. See Stomach, Diseases of; Dilatation.
 Schott Treatment. See Angina Pectoris—Dilatation of the Heart—Fatty Heart.

- Schroeder's Operation. See Uterus; Stenosis of Cervix.
- Schwabach's Test. See Internal Ear.
- Sciatic Coxalgia. See Guaiacol; Painful Disorders.
- Sciatica. See Acetanilid; Neuralgia—Antipyrine; Nervous Disorders—Atropine; Neuralgia—Chaulmugra-oil—Chloral—Colchicum; General Maladies—Erythroxylon Coca; Neuralgia—Ethyl-chloride; Neuralgia—Guaiacol; Painful Disorders—Ichthyol; Rheumatism—Jaborandi; Chronic Affections—Menthol; Painful Disorders—Methylene-blue—Nerves, Peripheral—Nitroglycerin; Nervous Disorders—Rheumatism; Acute—Salicylic Acid—Salicylic Acid; Antipyrine Salicylate—Salicylic Acid; Sodium Dithiosalicylate—Salophen—Sulphur; Lithæmic Disorders—Sulphur; Respiratory Disorders.
- Scirrhus Cancer of Breast. See Tumors of Breast; Cancer.
- Scirrhus Tumor. See Tumors.
- Scirrhus of Rectum. See Tumors of Rectum and Anus; Malignant Growths.
- Sclerodactyly. See Scleroderma.
- SCLERODERMA (*General Subject*). See Exophthalmic Goitre.
- Sclérose en Plaques. See Sclerosis of Brain.
- Sclérose Lobaire. See Sclerosis of Brain.
- Sclerosis. See Gold; Nephritis.
- Sclerosis, Amyotrophic Lateral. See Amyotrophic Lateral Sclerosis (Index)—Spinal Cord, Diseases of—Spinal Cord; Myelitis.
- Sclerosis, Arterial. See Arteriosclerosis (Index).
- Sclerosis, Combined Postero-Lateral. See Spinal Cord; Ataxic Paraplegia.
- Sclerosis, Disseminated. See Disseminated Sclerosis (Index).
- Sclerosis, Multiple. See Hysteria—Locomotor Ataxia—Spinal Cord; Hereditary Ataxia—Spinal Cord; Primary Lateral Sclerosis—Tumors of Brain.
- SCLEROSIS OF BRAIN (*General Subject*).
- Sclerosis of Cerebrum, Diffuse. See Tumors of Brain.
- Sclerosis of Liver. See Cirrhosis of the Liver.
- Sclerosis of Tongue. See Influenza.
- Sclerosis, Primary Lateral. See Spinal Cord; Amyotrophic Sclerosis.
- Sclerosis, Secondary Lateral. See Spinal Cord; Primary Lateral Sclerosis.
- Sclerosis, Spinal. See Spinal Sclerosis (Index).
- Sclerotic Lupus. See Tuberculosis of Skin; Lupus Erythematosus.
- Sclerotic Post-nasal Catarrh. See Naso-pharynx; Chronic Naso-pharyngitis.
- Sclerotics, Congestion of. See Yellow Fever.
- Sclerotinic Acid. See Ergot.
- Sclerotomy. See Tension of Eyeball; Glaucoma.
- Scolices. See Liver; Hydatid Cyst—Parasites, Intestinal; Tape-worms.
- Scoliosis. See Spinal Cord; Syringomyelia—Spine, Diseases of.
- Scopolamine. See Iritis.
- Scorbutic Sclerosis. See Scleroderma.
- SCORBUTUS (SCURVY) (*General Subject*). See Scurvy (Index).
- SCORBUTUS, INFANTILE (*General Subject*).
- Scorpion-stings. See Wounds and Stings.
- Scotoma, Central. See Hysteria—Toxic Amblyopia; Tobacco.
- Scrofula. See Chaulmugra-oil—Manganese.
- Scrofuloderma. See Euphen; Cutaneous Disorders—Strontium; Constitutional Disorders—Tuberculosis of Skin; Lupus Vulgaris.
- Scrofulosis. See Iodine—Iron—Phosphorus; Phosphates.
- Scrofulosis of Skin. See Thiol.
- Scrofulous Otorrhœa. See Strontium; Constitutional Disorders.
- Scrotal Hernia. See Hernia; Treatment of Reducible.
- Scrotal Pruritus. See Ethyl-chloride; Neuralgia.
- Scrotum, Lymph-. See Parasites; Filaria.
- Scudamore's Mixture. See Colchicum.
- Scurvy. See Cantharides—Mercury; Mercurial Cachexia—Pulmonary Circulation; Hæmorrhage—Scorbutus.
- Sea-salt. See Sodium.
- Seasickness. See Atropine; Excessive Vomiting—Cerium—Chloral—Erythroxylon Coca; Internal Administration—Menthol; Gastro-Intestinal Disorders—Nitrites; Nervous Disorders—Nitroglycerin; Gastro-Intestinal Disorders—Resorcin.
- Seat-worms. See Worms, Seat- (Index).
- Sebaceous Cysts. See Cysts, Sebaceous (Index).
- Sebaceous Horns. See Tumors; Epithelial.
- Sebaceous Tumor of Scalp. See Wounds of Head; Tumors of Scalp.
- SEBORRHŒA (STEARRHŒA) (*General Subject*).
- See Acne Rosacea—Alopecia—Eczema—Petroleum; External Use—Psoriasis—Sulphur; Cutaneous Disorders—Zinc; Cutaneous Disorders.
- Seborrhœa Capitis. See Seborrhœa.
- Seborrhœa Nigricans. See Seborrhœa; Oleosa.
- Seborrhœa Oleosa. See Seborrhœa.
- Seborrhœa Sicca. See Seborrhœa.
- Seborrhœic Eczema. See Resorcin.
- Secale Cereale. See Ergot.
- Secale-Cornutum Poisoning. See Glycosuria.
- Secalintoxin. See Ergot.
- Second Sight. See Myopia.
- Secondary Cirrhosis. See Cirrhosis of the Liver.
- Secondary Contracted Kidney. See Bright's Disease; Exudative Chronic.
- Secondary Hæmorrhage. See Vascular System; Injuries of Arteries.
- Secondary Lateral Sclerosis. See Spinal Cord; Primary Lateral Sclerosis.
- Secondary Syphilis. See Syphilis; General Infection.
- Secondary Wound Fever. See Surgical Diseases; Traumatic Fevers.
- Secretory Neuroses. See Stomach, Diseases of; Functional Diseases.
- Sedative. See Antipyrine—Bismuth—Bromine and Derivatives—Camphor—Cerium—Chloral—Lactucarium—Lead—Lupulus—Salicylic Acid; Antispasmin.
- Sedative, Arterial. See Aconite.
- Sedative, Circulatory. See Veratrum Viride.
- Sedative, Nerve. See Amyl-valerianate—Hyoscyamus—Nitrites—Nitroglycerin.
- Sedative, Nervous. See Paraldehyde—Silver; Silver Chloride.
- Sedative, Uterine. See Anemonin.
- Sedlitz Powder. See Sodium.
- Sedlitz Water. See Magnesia.
- Seed-wart. See Surgical Diseases of the Skin and its Appendages; Verruca.
- Seegen's Sugar Test. See Diabetes Mellitus.
- Segregation. See Leprosy.
- Semen Strychni. See Nux Vomica.
- Seminal Emissions. See Lupulus; Genito-Urinary Irritation—Neurasthenia.
- Seminal Vesiculitis. See Urinary System, Surgical Diseases of; Chronic Prostatitis.
- Seneca Oil. See Petroleum.
- Senescence of the Zonula. See Lens; Anomalies of Position.
- Senile Dementia. See Insanity.
- Senile Emphysema. See Pulmonary Emphysema.
- Senile Kidney. See Bright's Disease; Non-exudative Chronic.
- Senile Tremor. See Tremors; Tremor.
- Senna. See Hæmataria—Nursing; Breast-milk.
- Senn's Decalcified-Bone Plates. See Stomach, Surgery of; Intestines; Anastomosis.
- Sensory Neuroses. See Stomach, Diseases of; Functional Diseases.
- Sepsis. See Abdomen—Copper—Myocarditis—Wounds and Injuries of Thorax; Wounds of Lung.
- Sepsis, General. See Silver; Unguentum Credé.
- Sepsis, Puerperal. See Silver; Unguentum Credé.
- Septal Ulceration. See Euphen; Nasal Disorders.
- Septic Arthritis. See Joints.
- Septic Diseases. See Creasote.
- Septic Embolism of Brain. See Vascular Diseases of Brain; Embolism.
- Septic Endocarditis. See Typhoid Fever.
- Septic Infection. See Surgical Diseases; Traumatic Fever.
- Septic Peritonitis. See Uterine Adnexa; Inflammation of Tubes.
- Septic Pneumonia. See Toxic Foods; Grain Poisoning.
- Septic Poisoning. See Peritoneum; Acute Peritonitis.
- Septic Processes. See Malarial Fevers.
- Septic Wounds. See Wounds (Septic) and Gangrene.

- Septicæmia. See Abortion—Burns—Emphyema—Erythema Scarlatini-forme—Fractures—Malarial Fevers; Other Septic Processes—Meningitis; Lep-tomeningitis—Mouth; Gangrenous Stomatitis—Nucleins—Nursing and Artificial Feeding; Nurs-ing—Peritoneum; Acute Peritonitis—Phenace-tin; Lactophenin—Phenic (Carbolic) Acid—Plague—Pleurisy; Acute—Pulmonary Abscess—Pulmonary Circulation; Oedema—Quinine; In-flammation—Resorcin—Silver; Unguentum Crêdè—Spleen; Hyperæmia—Typhoid Fever; Com-plications—Urinary System, Surgical Diseases of; Wounds of Prostate—Uterus; Carcinoma of Cer-vix Uteri—Uterus; Inversion—Uterus; Sarcoma—Vagino-Perineal Injuries—Valvular Diseases of Heart; Acute Endocarditis—Vascular Sys-tem; Vascular Obstruction; Fat-embolism—Wounds (Septic) and Gangrene; Gangrene—Wounds (Septic) and Gangrene; Pyæmia.
- Septicæmic Neuritis. See Nerves, Peripheral; Mul-tiple Neuritis.
- Septicopyæmia. See Bright's Disease; Acute—Wounds (Septic) and Gangrene; Pyæmia.
- Septum, Crests of. See Nasal Cavities; Septum.
- Septum, Deviations of. See Nasal Cavities; Sep-tum.
- Septum, Diseases of the. See Nasal Cavities.
- Septum, Perforation of. See Nasal Cavities; Sep-tum.
- Septum, Spurs of. See Nasal Cavities; Septum.
- Sequestration Dermoids. See Tumors; Dermoids.
- Seropneumothorax. See Pleura; Pneumothorax.
- Serotherapy. See Plague.
- Serous Effusions. See Effusions, Serous (Index).
- Serous Leptomeningitis. See Meningitis.
- Serous Retinitis. See Optic Nerve and Retina; Ret-initis.
- Serous Transudation. See Vascular System; Vas-cular Obstruction; Thrombosis.
- Serum, Antidiphtheritic. See Nasal Cavities; Atro-phic Rhinitis.
- Serum, Antistreptococcic. See Erysipelas—Peri-tonium; Acute Peritonitis—Scarlet Fever—Tubercu-losis of Lungs—Wounds (Septic) and Gangrene; Septicæmia.
- Serum, Antitoxin. See Antitoxin (Index)—Diph-theria.
- Serum, Calmette's Antivenomous. See Wounds and Stings; Snake-bites.
- Serum, Carasquilla's. See Leprosy.
- Serum, Marmorek's. See Erysipelas—Influenza—Ititis.
- Serum, Merck's. See Leprosy.
- Serum Reaction, Vidal's. See Typhoid Fever.
- Serum-therapy. See Diphtheria—Leprosy—Pneu-monia, Lobar—Wounds (Septic) and Gangrene; Septicæmia—Yellow Fever.
- Sessile Tumors. See Surgical Diseases of the Skin and its Appendages; Molluscum Contagiosum.
- Sewer-gas Poisoning. See Erythema Scarlatini-forme.
- Sexual Erethism. See Erethism (Index).
- Sexual Exhaustion. See Phosphorus; Nervous Dis-orders.
- Sexual Function, Loss of. See Spinal Cord; Ataxic Paraplegia—Spinal Cord; Primary Lateral Scle-rosis.
- Sexual Impotence. See Neurasthenia.
- Sexual Perversion. See Hypnotism; Vicious Habits.
- Sexual Power, Loss of. See Spinal Cord; Syringo-myelia.
- Shaggy Mushrooms. See Toxic Foods; Edible Mushrooms.
- Shell-fish Poisoning. See Toxic Foods.
- Sherry Wine. See Alcohol.
- Shingles. See Herpes Zoster.
- Ship-fever. See Typhus Fever.
- SHOCK (General Subject). See Abdomen—Alcohol; Injections—Ammonia—Chloroform; Untoward Effects—Ether; Therapeutics—Fractures—Nerves, Wounds and Injuries of—Nitrites; Cardiac Disorders—Oxygen; Inhalation—So-dium; Poisoning—Stomach, Diseases of; Gastric Ulcer—Urinary System, Surgical Diseases of; Rupture of Bladder—Vascular System; Vascular Obstruction; Fat-embolism—Wounds and In-juries of Thorax; Mural Injuries—Wounds and Injuries of Thorax; Pneumothorax—Wounds and Injuries of Thorax; Rupture of Lung—Wounds and Injuries of Thorax; Wounds of
- Heart—Wounds of Head; Wounds of Sinuses of Brain.
- Shock, Surgical. See Strychnine.
- Shoulder, Dislocations of. See Dislocations.
- Shoulder, Pain in. See Cirrhosis of the Liver; Portal.
- Shoulders, Loose. See Muscles; Dystrophies.
- Shrimps Poisoning. See Toxic Foods; Shell-fish Poisoning.
- Sialagogue. See Arecoline—Jaborandi.
- Sick Headache. See Headache, Sick (Index).
- Siderosis. See Pneumonokoniosis.
- Sighing. See Cerebral Hæmorrhage.
- Sighing Respiration. See Respiration, Sighing (In-dex).
- Sight, Failure of. See Toxic Amblyopia.
- Silicate-of-Soda Splints. See Splints, Silicate of Soda (Index).
- SILVER (General Subject). See Argonin.
- Silver-Fork Deformity. See Fractures of Radius.
- Silver Lactate. See Actol.
- Silver Nitrate. See Conjunctiva—Cystitis—Silver; Argonin—Stomach, Diseases of; Gastric Ulcer.
- Silver-Nitrate Poisoning. See Silver.
- Silver Phosphate. See Silver; Argentamine.
- Silver Stains, Removal of. See Silver.
- Sinapis. See Mustard.
- Singer's Nodes. See Tumors of Larynx and Lungs; Larynx.
- Singultus. See Uterine Adnexa; Tumors of Ovaries.
- Singultus Tendinum. See Musk.
- Sinking-spells. See Ether; Therapeutics.
- Sinus, Blocking of Cavernous. See Vascular Dis-eases of Brain; Thrombosis of Sinuses.
- Sinus, Empyema of. See Nasal Cavities; Purulent Rhinitis.
- Sinus, Empyema of Ethmoidal. See Orbit; Miscel-laneous Diseases.
- Sinus, Empyema of Frontal. See Orbit; Miscel-laneous Diseases.
- Sinus, Empyema of Maxillary. See Orbit; Miscel-laneous Diseases.
- Sinus of Hip. See Hip-joint Disease.
- Sinus Pulse. See Vascular Diseases of Brain; Thrombosis of Sinuses.
- Sinuses. See Europhen; Wounds—Hydrogen Di-oxide; Purulent Affections—Sodium; Surgical Disorders.
- SINUSES, DISEASES OF (General Subject).
- Sinuses, Indolent. See Silver; Surgical Disorders.
- Sinuses, Lateral. Wounds of. See Wounds of Head; Wounds of Sinuses of Brain.
- Sinuses of Brain. Wounds of. See Wounds of Head; Wounds of Sinuses of Brain.
- Sinuses, Superior Longitudinal, Wounds of. See Wounds of Head; Wounds of Sinuses of Brain.
- Sinus-phlebitis. See Cerebral Abscess.
- Sinus-thrombosis. See Thrombosis, Sinus (Index).
- Sitiophobia. See Insanity.
- Skeer's Sign. See Meningitis; Leptomeningitis.
- Skin, Bluish-Slate Color of. See Silver; Chronic Poisoning.
- Skin, Bronzing of. See Bronzing of Skin (Index).
- Skin, Cornification of the. See Surgical Diseases of the Skin and its Appendages; Keratosis Se-nilis.
- Skin Diseases, Parasitic. See Sodium; Cutaneous Disorders.
- Skin Diseases, Scaly. See Sulphur; Cutaneous Dis-orders.
- Skin, Dryness of. See Myxœdema.
- Skin, Grayish Patches on. See Silver; Chronic Poi-soning.
- Skin, Greenish Coloration of. See Valvular Dis-eases of Heart; Tricuspid Regurgitation.
- Skin, Icteric Hue of. See Jaundice—Yellow Fever.
- Skin, Induration of. See Scleroderma.
- Skin, Inflammation of. See Dermatitis—Sulphur; Respiratory Disorders.
- Skin, Maceration of. See Intertrigo.
- Skin, Miliary Tuberculosis of. See Tuberculosis of Skin.
- Skin, Pigmentation of. See Arsenic; Physiological Action—Exophthalmic Goitre.
- Skin, Roughness of. See Toxic Foods; Grain Poi-soning.
- Skin, Scrofulosis of. See Thiol.
- Skin, Sloughing of. See Dermatitis Gangrenosa.
- Skin, Tuberculosis of. See Tuberculosis of Skin.
- Skin Warts. See Tumors; Epithelial.

- SKIN-GRAFTING (*General Subject*). See Plastic Surgery.
- Skodaic Resonance. See Empyema—Pneumonia, Lobar.
- Skull, Atrophy of Bones of. See Wounds of Head; Diseases Involving Skull.
- Skull, Depressed Fracture of. See Wounds of Head; Contusions of Scalp—Wounds of Head; Extradural Hæmorrhage.
- Skull, Diseases of. See Wounds of Head.
- Skull, Epithelioma of. See Wounds of Head; Tumors of Skull.
- Skull, Fractures of. See Alcoholism; Acute—Insanity; Cranial Traumatism.
- Skull, Hypertrophy of Bones of. See Wounds of Head; Diseases Involving Skull.
- Skull, Injuries of. See Wounds of Head; Diseases Involving Skull.
- Skull, Lacerated Aponeurosis of. See Fractures of Skull.
- Skull, Malformations of. See Wounds of Head; Diseases Involving Skull.
- Skull, Punctures of. See Fractures of Skull—Hydrocephalus; Chronic.
- Skull, Resection of. See Wounds of Head; Technique of Intracranial Surgery.
- Skull, Sarcoma of. See Wounds of Head; Tumors of Skull.
- Skull, Surgery of. See Wounds and Injuries of the Head.
- Skull, Thinning of. See Osseous System; Rickets.
- Skull, Trauma of. See Cerebral Abscess.
- Skull, Tumors of. See Wounds of Head; Diseases Involving Skull.
- Sleeplessness. See Insomnia (Index) — Sulphonal — Syphilis; General Infection.
- Sleep-walking. See Epilepsy.
- Sloughing of Skin. See Dermatitis Gangrenosa.
- Sloughing Ulcers. See Ulcers, Sloughing (Index).
- Slow Heart. See Vasculo-Cardiac Neuroses.
- Small-pox. See Insanity; Post-febrile — Iodine; Skin Disorders — Mercury; Chlorides — Phenic (Carbolic) Acid—Silver; Cutaneous Disorders — Stomach, Diseases of; Phlegmonous Gastritis — Sulphur; Cutaneous Disorders—Variola (Index).
- Small-pox, Hæmorrhagic. See Valvular Diseases of Heart; Acute Endocarditis; Septicæmia.
- Smell, Loss of. See Respiratory Organs; Nasal Neuroses.
- Smell, Perverted Sense of. See Respiratory Organs; Nasal Neuroses.
- Smell, Sensitiveness of Sense of. See Respiratory Organs; Nasal Neuroses.
- Smith-Marechal's Test. See Choluria.
- Smith's Anterior Splint. See Fractures of Femur.
- Smoky Urine. See Urine, Smoky (Index).
- Snake-bites. See Alcohol; Poisoned Wounds—Ammonia; Stings of Insects — Manganese; Antidote—Wounds and Stings.
- Snake-venom. See Jaundice; Toxæmia — Toxic Foods; Ptomaines.
- Sneezing, Spasmodic. See Respiratory Organs; Nasal Neuroses.
- Snellen's Sutures. See Palpebræ; Ectropion.
- Snoring. See Tonsils; Hypertrophy — Wounds of Head; Compression of Brain.
- Snuffles. See Syphilis; Congenital.
- Snuff's, Catarrh-. See Erythroxyton Coca and Cocaine.
- Soda. See Sodium.
- Soda-lye. See Sodium.
- SODIUM (*General Subject*).
- Sodium Borosalicylate. See Salicylic Acid.
- Sodium Casein. See Silver; Argonin.
- Sodium Choleate. See Ox-gall.
- Sodium Poisoning. See Sodium.
- Sodium-Salicylate Eruption. See Dermatitis Medicamentosa.
- Soft Fibroma. See Tumors.
- Soft Polyp of Rectum. See Tumors of Rectum and Anus; Benign.
- Solanine. See Alkaloids—Toxic Foods; Grain Poisoning.
- Soluble Glass. See Sodium.
- Solution, Villate's. See Zinc; Sulphate.
- Solvent. See Glycerin—Pancreatin—Pepsin—Petroleum.
- Solvent, Surgical. See Pepsin.
- Solvent, Uric Acid. See Piperazin.
- Somatose. See Agalactia—Nursing; Means of Improving Breast-milk.
- Somnal. See Chloral.
- Somnambulism. See Catalepsy—Hysteria.
- Somnambulistic State. See Hypnotism.
- Somnifacient. See Allys—Amylene-hydrate—Atropine—Opium and Derivatives—Paraldehyde.
- Somnolence. See Milk-sickness—Sulphonal; Physiological Action—Toxic Foods; Phalline Poisoning — Vascular System; Vascular Obstruction; Fat-embolism.
- Soor. See Mouth; Parasitic Stomatitis.
- Soporific. See Cannabis Indica—Hyoscyamus—Lupulus.
- Sordes. See Glycerin.
- Sore Throat. See Angina (Index) — Copper; Diseases of Mouth and Throat — Syphilis; Syphilides—Tonsils; Pharyngitis.
- Sore Throat, Gouty. See Thiol.
- Sore Throat, Malignant. See Sodium; Laryngological Disorders.
- Sore Throat, Rheumatic. See Thiol.
- Sore Throat, Scarlatinal. See Potassium; Chlorate.
- Sores, Bed-. See Bed-sores (Index).
- Sores, Painful. See Orthoform.
- Sores, Venereal. See Venereal Sores (Index).
- Sorrel. See Oxalic Acid—Oxaluria.
- Sorrel, Poisoning by. See Oxalic Acid.
- Soziodol. See Iodine.
- Sozolic Acid. See Phenic (Carbolic) Acid; Aseptol.
- Spacelotoxin. See Ergot.
- Spanish Fly. See Cantharides.
- Spasm. See Coffee; Poisoning—Hydrocyanic Acid—Rabies — Spinal Cord; Myelitis — Toxic Foods; Grain Poisoning.
- Spasm, Bronchial. See Asthma.
- Spasm, Facial. See Gelsemium; Spasmodic Disorders—Respiratory Organs; Nasal Reflex Neuroses.
- Spasm, Facial Muscular. See Facial Muscular Spasm (Index).
- Spasm, Habit. See Chorea; Anomalous Varieties.
- Spasm, Histrionic. See Physostigma; Spasmodic Disorders.
- Spasm, Hysterical. See Gelsemium; Spasmodic Disorders.
- Spasm, Laryngeal. See Laryngeal Spasm (Index)—Laryngismus Stridulus (Index).
- Spasm, Localized. See Meningitis.
- Spasm, Muscular. See Muscular Spasm (Index) — Tumors of Brain.
- Spasm, Nodding. See Chorea, Anomalous Varieties.
- Spasm, Œsophageal. See Œsophagus; Neuroses.
- Spasm of Arteries. See Vascular System; Arteriosclerosis.
- Spasm of Bladder. See Bladder, Spasm of (Index).
- Spasm of Calf-muscles. See Hip-joint Disease.
- Spasm of Cervix Uteri. See Parturition; Abnormal.
- Spasm of Ocular Muscles. See Encephalitis; Acute Non-suppurative.
- Spasm of Perineum. See Parturition; Abnormal.
- Spasm of Tongue. See Encephalitis; Acute Non-suppurative.
- Spasm of Vulva. See Parturition; Abnormal.
- Spasm, Oscillatory. See Chorea, Anomalous Varieties.
- Spasm, Tetanic. See Petroleum; Physiological Action—Strychnine; Poisoning.
- Spasm, Tonic. See Spinal Cord; Primary Lateral Sclerosis—Tetanus.
- Spasm, Urethral. See Cannabis Indica; Renal Maladies.
- Spasm, Vasomotor. See Wounds (Septic); Ergot Gangrene.
- Spasmodic Asthma. See Zinc; Respiratory Disorders.
- Spasmodic Cough. See Cough, Spasmodic (Index).
- Spasmodic Laryngitis. See Respiratory Organs.
- Spasmodic Wryneck. See Nerves, Peripheral; Localized Neuritis.
- SPASMS AND CONVULSIONS IN CHILDREN (*General Subject*).
- Spastic Ataxia, Progressive. See Spinal Cord; Ataxic Paraplegia.
- Spastic Contracture. See Spinal Cord; Primary Lateral Sclerosis.
- Spastic Hemiplegia. See Encephalitis; Prenatal.
- Spastic Paraplegia. See Paraplegia, Spastic (Index).

- Spastic Rigidity. See Spinal Cord; Amyotrophic Sclerosis.
- Spastic Spinal Paralysis. See Spinal Cord; Primary Lateral Sclerosis.
- Spear-mint. See Mentha.
- SPECIFIC INFECTIOUS FEVERS (*General Subject*).
- Spectral Analysis. See Hæmaturia.
- Speech, Disturbances of. See Plague.
- Speech, Scanning. See Insanity; General Paresis—Sclerosis of Brain.
- Spermatic Cord, Injury to. See Hernia; Inguinal.
- Spermatocele. See Penis and Testicles.
- Spermatorrhœa. See Camphor; General Maladies—Cannabis Indica; Reproductive Organs—Digitalis; Anaphrodisiac—Ergot; Genital Disorders—Hydrastis—Hyoscyamus—Hypnotism—Iron; Venereal Disorders.
- Sphacelinic Acid. See Ergot.
- Sphacelotoxin. See Ergot.
- Sphenoidal Abscess. See Sinuses; Sphenoidal.
- Sphenoidal Sinus, Inflammation of. See Sinuses.
- Sphincter Ani, Paralysis of. See Wounds of Head; Compression of Brain.
- Sphincters, Paralysis of. See Cocainomania—Diphtheria—Spinal Cord; Syringomyelia.
- Spider's Bite. See Wounds and Stings.
- Spina Bifida. See Spine, Diseases of—Tumors; Cysts.
- Spina Bifida Occulta. See Spine, Diseases of; Spina Bifida.
- Spina Ventosa. See Osseous System; Bone Tuberculosis.
- Spinach. See Oxaluria.
- Spinach Evacuations. See Dysentery.
- Spinal Accessory Nerve, Neuritis of. See Nerves, Peripheral; Localized Neuritis.
- Spinal Convulsions. See Convulsions, Spinal (Index)—Hydrastis; Poisoning—Strychnine; Physiological Action.
- Spinal Cord, Changes in. See Anæmia, Pernicious.
- SPINAL CORD, DISEASES OF (*General Subject*).
- See Cantharides; Nervous Disorders.
- Spinal Cord, Disseminated Sclerosis of. See Hypnotism; Organic Disease.
- Spinal Cord, Hemorrhage into. See Spinal Cord; Landry's Paralysis—Spinal Cord; Syringomyelia—Spine, Diseases of; Sprain—Spine, Diseases of; Tumors.
- Spinal Cord, Tumor of. See Spinal Cord; Myelitis—Spinal Cord; Syringomyelia—Spine, Diseases of; Tumors.
- Spinal Curvature. See Muscles; Dystrophies—Spine, Curvature of (Index).
- Spinal Depressant. See Veratrum Viride; Physiological Action.
- Spinal Hemorrhage. See Spinal Cord; Myelitis—Spine, Diseases of; Sprain.
- Spinal Irritation. See Meningitis; Spinal.
- Spinal Localization. See Spine, Diseases of.
- Spinal Meningitis. See Meningitis, Spinal (Index).
- Spinal Muscles, Rigidity of. See Meningitis; Spinal.
- Spinal Muscular Atrophy. See Spinal Cord; Myelitis.
- Spinal Myositis. See Locomotor Ataxia.
- Spinal Nerves, Inflammation of. See Nerves, Peripheral.
- Spinal Pachymeningitis, Syphilitic. See Spinal Cord; Myelitis.
- Spinal Pachymeningitis, Tubercular. See Spinal Cord; Myelitis.
- Spinal Paralysis, Infantile. See Spinal Cord; Poliomyelitis.
- Spinal Paralysis, Spastic. See Spinal Cord; Primary Lateral Sclerosis.
- Spinal Sclerosis. See Phosphorus; Nervous Disorders—Toxic Foods; Grain Poisoning.
- Spinal Sclerosis, Anterior. See Silver; Nervous Disorders.
- Spinal Sclerosis, Posterior. See Silver; Nervous Disorders.
- Spindle-Cell'd Sarcoma. See Tumors; Connective Tissue.
- Spine, Abscess of. See Spine, Diseases of; Tuberculosis.
- Spine, Curvature of. See Curvature of Spine (Index)—Muscles; Dystrophies—Osseous System; Rickets—Spinal Cord; Hereditary Ataxia—Spinal Cord; Syringomyelia.
- SPINE, DISEASES AND INJURIES OF (*General Subject*).
- Spine, Diseases of the. See Osseous System; Bone Tuberculosis.
- Spine, Dislocation of. See Dislocations.
- Spine, Fracture of. See Spine, Diseases of; Tuberculosis.
- Spine, Hyperæsthesia Over. See Meningitis; Spinal.
- Spine, Hysterical. See Spine, Diseases of; Tuberculosis—Typhoid Fever; Complications.
- Spine, Neuroses of. See Spine, Diseases of; Tuberculosis.
- Spine, Railway. See Spine, Diseases of; Sprains—Typhoid Fever; Complications.
- Spine, Tuberculosis of. See Spine, Diseases of.
- Spirit of Mindererus. See Ammonium.
- Spirits. See Alcohol—Malt.
- Spiritus Ætheris Nitrosi. See Nitrites.
- Spirocheta, Obermeier's. See Specific Infectious Fevers; Relapsing.
- Splanchnoptosis. See Intestines; Enteroptosis.
- Spleen, Abscesses of. See Abscess of Spleen (Index).
- Spleen, Atrophy of. See Spleen, Diseases of—Spleen, Wandering.
- SPLEEN, DISEASES OF (*General Subject*).
- Spleen, Enlargement of. See Cirrhosis of the Liver; Portal—Leukæmia—Malarial Fevers—Mercury; Metallic—Syphilis; General Infection—Typhoid Fever—Urinary System, Diseases of; Amyloid Kidney—Wounds (Septic) and Gangrene; Septicæmia.
- Spleen, Hemorrhage from. See Abdomen; Contusions—Abdomen; Penetrating Wounds.
- Spleen, Hyperplasia of. See Status Lymphaticus.
- Spleen, Infarctions in. See Valvular Diseases of Heart; Acute Endocarditis.
- Spleen, Laceration of. See Abdomen, Injuries of.
- Spleen, Lesions of. See Abdomen, Injuries of—Anæmia, Pernicious.
- Spleen, Rupture of. See Abdomen; Contusions.
- Spleen, Tumors of. See Hydronephrosis—Spleen, Diseases of.
- Spleen, Wounds of. See Abdomen; Penetrating Wounds.
- Splenculi. See Spleen; Malformations.
- Splenectomy. See Abdomen, Injuries of.
- Splenic Artery, Embolism of. See Spleen; Infarcts.
- Splenic Artery, Thrombosis of. See Spleen; Infarcts.
- Splenic Enlargement. See Spleen, Enlargement of (Index).
- Splenic Extract. See Animal Extracts.
- Splenic Fever. See Anthrax.
- Splenic Leukæmia. See Pseudoleukæmia.
- Splint. See Fractures—Hip-joint Disease—Orthopædic Surgery.
- Splint, Ambulatory. See Fractures.
- Splint, Buck's Traction. See Fractures of Femur.
- Splint, Gooch's. See Fractures.
- Splint, Hodgson's Traction. See Fractures; Femur.
- Splint, Molded. See Fractures.
- Splint, Plaster-of-Paris. See Fractures.
- Splint, Silicate of Soda. See Fractures—Joints; Arthritis.
- Splint, Smith's Anterior. See Fractures of Femur.
- Spondylitis. See Spine, Diseases of; Tuberculosis.
- Spondylitis, Rheumatic. See Spine, Diseases of; Tuberculosis.
- Sponge-grafting. See Skin-grafting; Anomalies.
- Spongy Gums. See Gums, Spongy (Index).
- Spontaneous Combustion. See Alcohol, Combustion During.
- Sporadic Cholera. See Cholera Morbus.
- Sporadic Cirrhosis. See Cirrhosis of the Liver.
- Sporadic Cretinism. See Myxedema.
- Spotted Fever. See Meningitis; Cerebro-Spinal—Typhus Fever.
- "Sprain-fracture." See Sprain.
- SPRAINS (*General Subject*).
- See Belladonna; External Uses—Calaput-oil; External Use—Dislocations—Hamamelis; Hemorrhage—Ichthyol; Wounds and Injuries—Lead; External Application—Muscles; Surgical Diseases—Petroleum; External Use—Sodium; Surgical Disorders.
- Sprains of Vertebral Column. See Spine, Diseases of.
- Spring-water, Buxton. See Gout.
- Spring-water, Carlsbad. See Carlsbad Water (Index).
- Spring-water, Contréxeville. See Contréxeville Water (Index).

- Spring-water, Friedrichshall. See Magnesia; Purgative.
- Spring-water, Gastein. See Gout.
- Spring-water, Hunyadi. See Magnesia; Purgatives.
- Spring-water, Londonderry Lithia. See Lithium.
- Spring-water, Pfeffer's. See Gout.
- Spring-water, Pullna. See Magnesia; Purgative.
- Spring-water, Sandifjord. See Gout.
- Sprouting-Potato Poisoning. See Toxic Foods; Grain Poisoning.
- Sprue. See Mouth; Parasitic Stomatitis.
- Spurious Keloid. See Surgical Diseases of the Skin and its Appendages; Keloid.
- Spurious Pregnancy. See Pregnancy, Disorders of.
- Spurred Rye. See Ergot.
- Sputum, Amœba Coli in. See Liver; Abscess.
- Sputum, Black. See Pneumonokoniosis.
- Sputum, Blood-stained. See Pulmonary Circulation; Congestion—Pulmonary Circulation; Hemorrhage.
- Sputum, Bloody. See Pulmonary Circulation; Edema.
- Sputum, Bloody Gelatinous. See Pulmonary Circulation; Embolism.
- Sputum, Dirty-Red Puriform. See Liver; Abscess.
- Sputum, Elastic Fibres in. See Pulmonary Abscess.
- Sputum, Flukes in. See Parasites; Distoma Pulmonale.
- Sputum, Frothy. See Pulmonary Circulation; Congestion—Pulmonary Circulation; Edema.
- Sputum, Mucoid. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
- Sputum, Mucopurulent. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
- Sputum, Offensive. See Pulmonary Abscess and Gangrene.
- Sputum, Prune-juice. See Pneumonia, Lobar—Tumors of Larynx and Lungs; Carcinoma of Lungs.
- Sputum, Purulent. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
- Sputum, Pus in. See Pulmonary Abscess.
- Sputum, Red. See Pneumonokoniosis.
- Sputum, Rusty. See Pneumonia, Lobar—Tuberculosis of Lungs; Phthisis Florida.
- Sputum, Watery. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
- Squamous Epithelioma. See Tumors.
- Squamous Induration. See Syphilis; Initial Lesion.
- Squamous Syphilide. See Syphilis; Syphilides.
- Squibb's Ergotine. See Ergot.
- Squint. See Strabismus—Syphilis; Congenital.
- Squint, Dynamic. See Strabismus.
- Squire's "Mistura Ferri Laxans." See Iron.
- Squirting Cucumber. See Elaterium.
- Ssabanajew-Frank Operation. See Stomach; Surgery of; Gastrostomy.
- St. Anthony's Dance. See Chorea.
- St. Anthony's Fire. See Erysipelas.
- St. Ignatius's Bean. See Nux Vomica.
- St. Vitus's Dance. See Chorea.
- Stab Wound of Spine. See Spine, Diseases of; Wounds.
- "Stage-fright." See Vasculo-Cardiac Neuroses; Palpitation.
- Stains, Black. See Nitric Acid.
- Stains, White. See Nitric Acid.
- Stains, Yellow. See Nitric Acid.
- Stammering. See Deaf-mutism—Hypnotism; Functional Disorders.
- Stapedectomy. See Middle Ear; Otitis Media.
- Staphylococcus Pyogenes. See Appendicitis.
- Staphylococcus Pyogenes Aureus. See Cystitis.
- Staphyloma, Anterior. See Cornea, Opacities of.
- Staphyloma, Ciliary. See Iris, Ciliary Body, and Choroid; Tumors.
- Staphyloma, Corneal. See Cornea; Opacities of.
- Staphylorrhaphy. See Plastic Surgery; Cleft Palate.
- Starch, Glycerite of. See Glycerin.
- Status Epilepticus. See Epilepsy—Insanity; Epileptic Dementia.
- STATUS LYMPHATICUS AND DISORDERS OF THE LYMPHATIC SYSTEM (*General Subject*).
- Stealing. See Hypnotism; Vicious Habits.
- Steam Inhalations. See Croup—Diphtheria.
- Steapsin. See Pancreatin.
- Stearrhœa. See Seborrhœa.
- Steatoma. See Surgical Diseases of the Skin and its Appendages; Sebaceous Cysts.
- Stellwag's Sign. See Exophthalmic Goitre.
- Stenocardia. See Angina Pectoris.
- Stenosis, Aortic. See Aortic Stenosis (Index).
- Stenosis, Laryngeal. See Laryngeal Stenosis (Index).
- Stenosis, Mitral. See Mitral Stenosis (Index).
- Stenosis of Cervix Uteri. See Cervix Uteri, Stenosis of (Index).
- Stenosis of Pylorus. See Stomach; Surgery of; Gastro-Enterostomy.
- Stenosis of Pylorus, Non-malignant. See Stomach; Surgery of; Pyloroplasty.
- Stenosis, Pulmonary. See Valvular Diseases of Heart; Pulmonary Stenosis.
- Stenosis, Pyloric. See Pyloric Stenosis (Index).
- Stenosis, Tracheal. See Leukæmia—Salicylic Acid; Poisoning.
- Stenosis, Tricuspid. See Tricuspid Stenosis (Index).
- Steppage. See Diabetes Mellitus.
- Stercoral Ulcer, Perforating. See Stomach; Surgery of; Intestines.
- Stereopten. See Cube.
- Sterility. See Endometritis—Gold; Gynecological Disorders—Urinary System, Surgical Diseases of; Gonorrhœa in Women—Uterine Adnexa; Inflammations of Ovary—Uterus; Malformations—Uterus; Myoma—Uterus; Stenosis of Cervix.
- Sterilization of Milk. See Nursing and Infant-feeding.
- Sternberg, Bacillus "X" of. See Yellow Fever.
- Sterno-Mastoid Muscle, Paralysis of. See Diphtheria—Nerves, Peripheral; Localized Neuritis.
- Sterno-Mastoid Muscle, Weakness of. See Nerves, Peripheral; Localized Neuritis.
- Sternum, Dislocation of. See Dislocation.
- Sternum, Fractures of. See Fractures.
- Sternum, Necrosis of. See Wounds and Injuries of Thorax; Secondary Complications.
- Stertor. See Wounds of Head; Compression of Brain—Wounds of Head; Wounds of Brain.
- Sthenic Inflammations. See Veratrum Viride.
- Stiffness of Neck. See Tetanus.
- Stiffness of Throat. See Strychnine; Physiological Action.
- Stigmata Maydis. See Corn-ergot and Corn-silk.
- Stimson's Dressing. See Fractures; Clavicle.
- Stimulant. See Acetic Acid—Alcohol—Barium—Benzoic Acid—Benzoin—Cajuput-oil—Calcium—Camphor—Chamomile—Coffee and Caffeine—Cubeb—Erythroxylon Coca and Cocaine—Ether—Ethyl-chloride—Gaultheria—Iodine and Derivatives—Musk—Nitric Acid—Nux Vomica—Petroleum—Pix Liquida—Sandal-wood—Silver—Turpentine—Zinc; Physiological Action.
- Stimulant, Cardiac. See Adonis—Alcohol—Ammonia—Coffee and Caffeine—Creasote—Digitalis—Heart Stimulant (Index)—Pyridin—Salicylic Acid; Theobromine and Sodium Iodosalicylate.
- Stimulant, Cerebral. See Anhalonium Lewinii—Coffee and Caffeine—Erythroxylon Coca and Cocaine—Quinine.
- Stimulant, Genito-Urinary. See Juniper.
- Stimulant, Local. See Coffee—Creasote—Mercury; Phenic (Carbolic) Acid.
- Stimulant, Nerve. See Creasote—Salicylic Acid; Theobromine and Lithium Salicylate.
- Stimulant, Alterative. See Turpentine.
- Stings, Bee-. See Bee-stings (Index).
- Stings, Insect. See Alcohol; Externally—Ammonia—Hydrogen Dioxide—Ichthyol; Wounds—Wounds and Stings—Potassium; Alkaline Solutions.
- Stings, Venomous. See Coffee—Wounds and Stings.
- Stings, Wasp-. See Dermatitis Venenata—Wounds and Stings.
- Stomach. See Gastric (Index).
- Stomach, Acidity of. See Sodium; Gastro-Intestinal Disorders.
- STOMACH AND INTESTINES, SURGERY OF (*General Subject*).
- Stomach, Atony of. See Gastric Atony (Index)—Quassia.
- Stomach, Cancer of. See Methyl-blue—Sodium; Gastro-Intestinal Disorders—Stomach, Carcinoma of (Index)—Stomach; Surgery of; Gastro-enterostomy.
- Stomach, Carcinoma of. See Gastric Carcinoma (Index)—Stomach, Cancer of (Index)—Stomach, Diseases of; Carcinoma—Stomach, Diseases of;

- Chronic Gastritis—Stomach, Diseases of; Gastric Ulcer—Stomach; Surgery of; Gastroctomy.
- Stomach, Catarrh of. See Quinine; Tonic—Stomach, Diseases of.
- Stomach, Dilatation of. See Gastric Dilatation (Index)—Intestines; Duodenum; Ulceration—Stomach, Diseases of—Strontium; Gastro-Intestinal Disorders.
- STOMACH, DISEASES OF (*General Subject*).
- Stomach, Disorders of. See Anorexia Nervosa.
- Stomach, Erosions of. See Stomach, Diseases of; Gastric Ulcer.
- Stomach, Foreign Bodies in. See Stomach; Surgery of; Gastrotomy.
- Stomach, Gummous Patches of. See Syphilis; General Infection.
- Stomach, Hæmorrhage from. See Hæmatemesis (Index)—Scorbutus—Vascular System; Vascular Obstruction; Thrombosis.
- Stomach, Hæmorrhagic Erosions of. See Stomach; General Infection.
- Stomach, Hour-glass Contraction of. See Stomach, Diseases of; Gastric Ulcer—Stomach, Diseases of; Toxic Gastritis—Stomach; Surgery of; Gastro-gastrotomy.
- Stomach, Hyperacidity of. See Gastric Hyperacidity (Index)—Sodium; Genito-Urinary Disorders—Strontium; Gastro-Intestinal Disorders.
- Stomach in Alcoholism. See Alcoholism; Chronic.
- Stomach, Laceration of. See Abdomen; Contusions.
- Stomach, Lavage of. See Abdomen; Contusions—Lavage (Index).
- Stomach, Lesions of. See Abdomen; Contusions.
- Stomach, Perforation of. See Abdomen; Contusions—Abdomen; Penetrating Wounds—Liver; Empyema of Gall-bladder—Stomach; Surgery of; Ulcer—Uterine Adnexa; Tumors of Ovaries.
- Stomach, Rupture of. See Abdomen; Contusions.
- Stomach, Syphilis of. See Syphilis; General Infection.
- Stomach, Tumors of. See Liver; Tumors.
- Stomach, Ulcer of. See Stomach, Diseases of; Chronic Gastritis—Stomach, Diseases of; Ulcer.
- Stomach, Wounds of. See Abdomen; Penetrating Wounds.
- Stomachic. See Cajuput-oil—Cinnamon—Cube—Eucalyptus—Gentian—Hydrastis—Hydrochloric Acid—Jambul—Juniper—Lupulus—Mace—Mentha—Nux Vomica—Phosphoric and Hypophosphorous Acids—Quassia—Rhubarb.
- Stomach-vertigo. See Middle Ear; Otitis Media.
- Stomach-washing. See Infants, Diarrhœal Diseases of—Lavage (Index).
- Stomatitis. See Bismuth; Poisoning—Hydrastis; Topical Application—Leukæmia—Myxœdema—Phenic (Carbolic) Acid—Potassium; Chlorate—Resorcin—Scorbutus, Infantile—Tongue; Glossitis.
- Stomatitis Aphthosa. See Aphthous Stomatitis (Index).
- Stomatitis, Aphthous. See Aphthous Stomatitis (Index).
- Stomatitis, Catarrhal. See Mouth—Salicylic Acid.
- Stomatitis, Croupous. See Mouth.
- Stomatitis, Epidemic. See Mouth and Lips; Parasitic Stomatitis.
- Stomatitis Erythematosa. See Mouth; Catarrhal Stomatitis.
- Stomatitis, Fœtid. See Mouth; Ulcerative Stomatitis.
- Stomatitis, Follicular. See Mouth; Aphthous Stomatitis.
- Stomatitis, Gangrenous. See Mouth.
- Stomatitis, Membranous. See Mouth.
- Stomatitis, Mercurial. See Hydrochloric Acid—Mercury; Poisoning—Sodium; Gastro-Intestinal Disorders.
- Stomatitis Mycosa. See Mouth; Parasitic Stomatitis.
- Stomatitis, Parasitic. See Mouth.
- Stomatitis, Ulcerative. See Boracic Acid; Borax—Mouth—Nitric Acid; Internal Uses.
- Stomatitis Ulcerosa. See Mouth; Ulcerative Stomatitis.
- Stone in Bladder. See Urinary System, Diseases of (Surgical); Renal Calculus.
- Stone-cutter's Phthisis. See Pneumonokoniosis.
- Stones, Bile-. See Cholelithiasis.
- Stools, Ash Gray. See Abdomen; Contusion.
- Stools, Band-shaped. See Intestines; Tumors.
- Stools, Bile in. See Jaundice; Toxæmia.
- Stools, Bile-stained. See Malarial Fevers; Pernicious.
- Stools, "Bismuth." See Yellow Fever.
- Stools, Black. See Lead; Acute Poisoning.
- Stools, Bloody. See Abdomen; Contusion—Abdomen; Penetrating Wounds—Dysentery—Exophthalmic Goitre—Infants, Diarrhœal Diseases of—Intestines; Colitis—Intestines; Duodenum; Ulceration—Intestines; Tumors—Liver; Acute Yellow Atrophy—Malarial Fevers; Pernicious—Obstruction, Intestinal—Rectum and Anus; Fistula in Ano—Stomach, Diseases of; Gastric Ulcer—Tumors of Rectum and Anus; Benign—Valvular Diseases of Heart; Acute Endocarditis.
- Stools, Calculi in. See Cholelithiasis—Pancreas; Calculi.
- Stools, Clay-colored. See Abdomen; Penetrating Wounds—Jaundice; Obstructive—Liver; Angiocholitis.
- Stools, Curds in. See Nursing; Unsuccessful.
- Stools, Fatty. See Pancreas; Calculi.
- Stools, Greenish. See Infants, Diarrhœal Diseases of—Nursing; Unsuccessful.
- Stools, Membranes in. See Intestines; Colitis; Mucous—Malarial Fevers; Pernicious.
- Stools, Mucus in. See Dysentery—Infants, Diarrhœal Diseases of—Intestines; Colitis—Intestines; Colitis; Mucous—Intestines; Tumors—Obstruction, Intestinal—Rectum and Anus—Tumors of Rectum and Anus; Benign.
- Stools, Ochre-colored. See Typhoid Fever.
- Stools, Ova in. See Parasites; Intestinal.
- Stools, Parasites in. See Parasites; Intestinal.
- Stools, Pea-soup. See Typhoid Fever.
- Stools, Pencil-shaped. See Obstruction, Intestinal.
- Stools, Pseudomembrane in. See Infants, Diarrhœal Diseases of; Ileocolitis.
- Stools, Pus in. See Intestines; Tumors—Rectum and Anus; Fistula in Ano.
- Stools Resembling Small Balls. See Obstruction, Intestinal.
- Stools, Ribbon-shaped. See Intestine; Tumors—Obstruction, Intestinal.
- Stools, Rice-water. See Cholera Asiatica—Cholera Morbus—Toxic Foods; Phalline Poisoning.
- Stools, Riziform. See Cholera Asiatica.
- Stools, Tar-like. See Military Fever.
- Stools, Tarry. See Pix Liquida; Poisoning.
- Stools, Undigested Meat-fibres in. See Pancreas; Calculi—Pancreas; Tumors.
- Stout. See Alcohol.
- STRABISMUS (*General Subject*). See Diphtheria—Hydrocephalus—Hysteria; Motor Symptoms—Insanity; Idiocy—Lead; Chronic Poisoning—Locomotor Ataxia; Ocular-Muscle Palsies—Menigitis—Muscles; Myasthenia—Myopia—Salicylic Acid; Poisoning—Syphilis; Congenital—Tumors of Brain; Tumors of Pons—Wounds of Head; Wounds of Brain.
- Strabismus, Alternating. See Strabismus.
- Strabismus, Comitant. See Strabismus.
- Strabismus, Concomitant. See Strabismus.
- Strabismus, Constant. See Strabismus.
- Strabismus, Convergent. See Strabismus.
- Strabismus, Divergent. See Strabismus.
- Strabismus, Divergent, Latent. See Strabismus; Latent.
- Strabismus, External. See Strabismus.
- Strabismus, Intermittent. See Strabismus.
- Strabismus, Internal. See Strabismus.
- Strabismus, Latent. See Strabismus.
- Strabismus, Latent, Convergent. See Strabismus; Latent.
- Strabismus, Monocular. See Strabismus.
- Strabismus, Monolateral. See Strabismus.
- Strabismus, Paralytic. See Strabismus.
- Strabismus, Periodic. See Strabismus.
- Strabismus, Vertical. See Strabismus.
- Strabismus, Vertical, Latent. See Strabismus; Latent.
- Strain, Eye-. See Eye-strain (Index).[•]
- Strain, Muscular. See Muscles; Surgical Diseases.
- Stramonium. See Toxic Foods; Grain Poisoning.
- Stramonium Eruption. See Dermatitis Medicamentosa.
- Strangulated Hernia. See Hernia; Strangulated (Index).
- Strangulation, Intestinal. See Obstruction, Intestinal.
- Strangury. See Cannabis Indica; Renal Maladies—Cantharides—Colchicum; General Maladies—

- Strangury.
 Juniper; Poisoning — Pix Liquida; Poisoning — Pyrogallol; Poisoning — Turpentine; Physiological Action.
- Strawberry Tongue. See Scarlet Fever.
- Streptococcal Pleurisy. See Pleurisy; Acute.
- Streptococcus. See Appendicitis—Erysipelas.
- Streptococcus Pyogenes. See Cystitis.
- Striae. See Uterine Adnexa; Tumors of Ovaries.
- Striate Keratitis. See Keratitis.
- Striate Retinitis. See Optic Nerve and Retina; Retinitis.
- Stricture, Anal. See Constipation.
- Stricture, Intestinal. See Intestinal Stricture (Index).
- Stricture of Oesophagus. See Oesophagus, Stricture of (Index).
- Stricture of Oesophagus, Syphilitic. See Stomach; Surgery of; Gastrostomy.
- Stricture of Ureter. See Urinary System, Diseases of (Surgical); Ureters.
- Stricture of Urethra. See Urethra, Stricture of (Index).
- Stricture, Rectal. See Rectal Stricture (Index).
- Stricture, Spasmodic Oesophageal. See Silver; Surgical Disorders.
- Stricture, Urethral. See Urethral Stricture (Index).
- Stridorous Respiration. See Tumors of Larynx and Lungs.
- Strongylus Duodenalis. See Parasites; Intestinal; Anchylostoma.
- STRONTIUM (*General Subject*).
- Strophanthin. See Strophanthus.
- Strophanthus Poisoning. See Strophanthus.
- Strophulus Albidus. See Surgical Diseases of the Skin and its Appendages; Miliium.
- Struma. See Goitre—Phosphorus; Phosphates.
- Struma Aneurismatica. See Goitre.
- Struma Gelatinosum. See Goitre.
- Strumous Acne. See Strontium; Cutaneous Disorders.
- Strumous Conjunctivitis. See Conjunctiva.
- Strychnina. See Strychnine.
- STRYCHNINE (*General Subject*). See Alcoholism — Alkaloids — Chloroform; Methods of Resuscitation—Nux Vomica.
- Strychnine Poisoning. See Nitrites; Antidotal Uses — Physostigma; Antidotal Uses — Strychnine — Tetanus.
- Strychnos Nux-vomica. See Nux Vomica—Strychnine.
- Stupe. See Turpentine.
- Stupor. See Meningitis — Sulphonal; Physiological Action — Toxic Foods; Muscarine Poisoning — Uræmia—Urinary System, Diseases of; Pyelitis — Variola — Wounds of Head; Compression of Brain.
- Sturgeon Poisoning, Salted. See Toxic Foods; Shell-fish Poisoning.
- Stuttering. See Naso-pharynx; Adenoids.
- Stye. See Blepharitis—Hyperopia—Palpebræ; Hordeolum.
- Styptic. See Alum — Antipyrine — Cinnamon—Creasote—Hydrogen Dioxide—Iron—Sodium; Laryngological Disorders.
- Styracol. See Gualacol.
- Subacid Gastritis. See Stomach, Diseases of; Chronic Gastritis.
- Subacidity, Gastric. See Stomach, Diseases of; Functional Diseases.
- Subclavian Aneurism. See Aneurism.
- Subconjunctival Hæmorrhage. See Bright's Disease; Acute—Pertussis.
- Subcutaneous Emphysema. See Emphysema, Subcutaneous (Index).
- Subcutaneous Gumma. See Tuberculosis of Skin; Lupus Vulgaris.
- Subdiaphragmatic Abscess. See Abscess, Subdiaphragmatic (Index).
- Subdural Hæmorrhage. See Meningitis; Spinal—Wounds of Head; Diseases Involving Skull.
- Subhyaloid Hæmorrhages. See Optic Nerve and Retina; Retinitis.
- Subiliac Bursitis. See Tendons; Bursitis.
- Subinvolution of Uterus. See Uterus, Subinvolution of (Index).
- Subinvolution of Vagina. See Vagino-Perineal Injuries.
- Sublimed Sulphur. See Sulphur.
- Subluxation. See Dislocations.
- Subpectoral Abscess. See Wounds and Injuries of Thorax; Secondary Complications.
- Subperitoneal Hæmorrhage. See Abdomen; Contusion.
- Subphrenic Abscess. See Abscess, Subphrenic (Index).
- Subpleural Abscess. See Wounds and Injuries of Thorax; Secondary Complications.
- Subserous Uterine Fibroid. See Uterine Adnexa; Tumors of Ovaries.
- Substantive Emphysema. See Pulmonary Emphysema.
- Subsultus Tendinum. See Typhoid Fever — Typhus Fever—Uræmia.
- Sucking-worms. See Parasites; Trematodes.
- Sucrol. See Phenacetin; Dulcin.
- Sudamina. See Typhoid Fever.
- Suffocation. See Intubation.
- Suffocative Catarrh. See Pneumonia, Catarrhal.
- Sugar. See Phenacetin; Dulcin.
- Sugar in Urine. See Urine, Sugar in (Index).
- Sugar in Urine, Tests for. See Diabetes Mellitus.
- Sugar of Lead. See Lead.
- Suggestion. See Hypnotism—Hysteria.
- Suicidal Mania. See Typhoid Fever.
- Suicide, Tendency to. See Insanity; Melancholia.
- Sulfoal. See Sulphonal.
- Sulphocarbonate of Magnesium. See Phenic (Carbolic) Acid.
- Sulphocarbonate of Sodium. See Phenic (Carbolic) Acid.
- Sulphocarbonate of Zinc. See Phenic (Carbolic) Acid.
- SULPHONAL (*General Subject*). See Hæmatoporphyria—Insanity.
- Sulphonal Poisoning. See Sulphonal.
- SULPHUR (*General Subject*). See Ichthyol—Iodine; Sozoiodol — Potassium; Sozoiodolate — Resorcin; Thioresorcin.
- Sulphur, Calcic Liver of. See Sulphur.
- Sulphur, Liver of. See Potassium—Sulphur.
- Sulphur Eruption. See Dermatitis Venenata.
- Sulphur Poisoning. See Sulphur.
- Sulphureted Hydrogen. See Insanity; Acute Confusional.
- Sulphuric Acid. See Chromic Acid—Hæmoglobinuria.
- Sulphurous Breath. See Sulphur; Poisoning.
- Sumach, Chinese. See Ailantus.
- Summer Diarrhœa. See Cholera Morbus.
- Summer Diarrhœa of Infants. See Infants, Diarrhœal Diseases of.
- Sunburn. See Magnesia; External Uses—Sodium; Cutaneous Disorders.
- Sun-spots. See Tumors; Angiomata.
- Sun-stroke. See Insanity; Insolation—Insolation—Meningitis; Leptomeningitis.
- Sun-stroke, Electric. See Insolation; Thermic Fever.
- Superacidity, Gastric. See Stomach, Diseases of; Functional Diseases.
- Superficial Abscesses. See Toxic Foods; Grain Poisoning.
- Superior Longitudinal Sinuses, Wounds of. See Wounds of Head; Wounds of Sinuses of Brain.
- Suppression of Urine. See Urine, Suppression of (Index).
- Suppuration. See Formaldehyde; Cutaneous Disorders—Hydrogen Dioxide; Purulent Affections—Liver; Amyloid — Manganese; Scrofula — Mercury; Cyanide — Pix Liquida; Pixol — Surgical Diseases; Secondary Wound Fever — Surgical Diseases of the Skin and its Appendages; Carbuncle—Surgical Diseases of the Skin and its Appendages; Furuncle—Thiol—Urinary System, Diseases of; Amyloid Kidney—Wounds (Septic) and Gangrene; Pyæmia.
- Suppuration, Antral. See Antral Suppuration (Index).
- Suppuration, Ethmoidal. See Sinuses; Antrum — Sinuses; Ethmoiditis.
- Suppuration in Dilated Ureter. See Urinary System, Diseases of (Surgical); Ureterectomy.
- Suppuration, Mural. See Wounds and Injuries of Thorax; Secondary Complications.
- Suppuration of Joints of Pelvis. See Vascular System; Phlegmasia Alba Dolens.
- Suppuration of Vulva. See Vagina; Vulva; Vulvitis.
- Suppuration, Pelvic. See Uterine Adnexa; Inflammation of Tubes.

- Suppuration, Putrid. See Indicanuria.
 Suppurative Diseases. See Sulphur; Cutaneous Disorders.
 Suppurative Fever. See Surgical Diseases; Secondary Wound Fever.
 Suppurative Hepatitis. See Liver; Abscess.
 Suppurative Keratitis. See Keratitis.
 Suppurative Leptomeningitis. See Meningitis.
 Suppurative Nephritis. See Urinary System, Diseases of (Surgical); Nephrotomy.
 Suppurative Otitis Media. See Otitis Media, Suppurative (Index).
 Suppurative Pneumonitis. See Pulmonary Abscess.
 Suppurative Processes, Acute. See Silver; Unguentum Crede.
 Suppurative Pyelitis. See Urinary System, Diseases of; Pyelitis.
 Suppurative Tuberculosis. See Tuberculosis of Skin; Lupus Erythematosus.
 Suprarenal Capsules, Adenomata of. See Suprarenal Capsules; Tumors of.
 Suprarenal Capsules, Diseased. See Addison's Disease.
 SUPRARENAL CAPSULES, DISEASES OF (*General Subject*).
 Suprarenal Capsules, Fibromata of. See Suprarenal Capsules; Tumors.
 Suprarenal Capsules, Hæmorrhage into. See Suprarenal Capsules, Diseases of.
 Suprarenal Capsules, Lipomata of. See Suprarenal Capsules; Tumors.
 Suprarenal Capsules, Tumors of. See Suprarenal Capsules, Diseases of.
 Suprarenal Extract. See Addison's Disease—Animal Extracts—Conjunctiva; Catarrhal Conjunctivitis—Naso-pharynx; Acute Naso-pharyngitis.
 Suprarenal Gland, Tumors of. See Liver; Cancer of Gall-bladder.
 Supravaginal Hysterectomy, Abdominal. See Uterus; Myoma.
 SURGICAL DISEASES (*General Subject*).
 SURGICAL DISEASES OF THE SKIN AND ITS APPENDAGES (*General Subject*).
 Surgical Disorders. See Silver—Sodium.
 Surgical Fever. See Surgical Diseases; Primary Wound Fever.
 Surgical Kidney. See Urinary System, Diseases of; Pyelitis.
 Surgical Mycoses. See Mercury; Chlorides—Mercury; Metallic.
 Surgical Shock. See Strychnine.
 Surgical Solvent. See Pepsin.
 Suspension Treatment. See Locomotor Ataxia.
 Suture, Czerny-Lembert. See Stomach; Surgery of; Intestines; Enterorrhaphy.
 Suture, Dupuytren's. See Stomach; Surgery of; Intestines; Enterorrhaphy.
 Suture, Halsted's Mattress. See Stomach; Surgery of; Intestines; Enterorrhaphy.
 Suture, Lembert. See Stomach; Surgery of; Intestines; Enterorrhaphy.
 Suture of Heart. See Wounds and Injuries of Thorax.
 Swallowing, Difficulty in. See Rabies.
 Swamp Fever. See Malarial Fevers.
 Swamp-hellebore. See Veratrum Viride.
 Sweating. See Belladonna; Cutaneous Disorders—Exophthalmic Goitre—Jaborandi—Jaundice; Obstructive—Malarial Fevers—Resorcin—Poisoning—Spinal Cord; Syringomyelia—Urinary System, Diseases of (Surgical); Nephrotomy; Tuberculosis—Yellow Fever.
 Sweating, Bilateral. See Hysteria.
 Sweating, Cold. See Urinary System, Diseases of (Surgical); Renal Calculus.
 Sweating, Excessive. See Atropine; Excessive Diaphoresis—Hyperhidrosis (Index).
 Sweating Fever. See Miliary Fever.
 Sweating, Profuse. See Hydrochloric Acid; Cutaneous Disorders—Miliary Fever—Parasites; Trichina—Pelletierine—Salicylic Acid; Poisoning.
 Sweats. See Thyroid Gland; Thyroid Fever—Tuberculosis of Lungs; Phthisis Florida—Typhoid Fever—Urinary System, Diseases of; Pyelitis—Urinary System; Surgical Diseases of; Urethral Fever.
 Sweats, Clammy. See Zinc; Poisoning.
 Sweats, Cold. See Wounds and Stings; Snake-bites.
 Sweats, Night-. See Night-sweats (Index).
 Swedish Cholera Drops. See Opium.
 Sweet-birch. See Salicylic Acid.
 Swelling of Arytenoids, Pyiform. See Tuberculosis of Larynx.
 Swelling of Lower Extremity. See Vascular System; Phlegmasia Alba Dolens.
 Swelling of Lymphatic Glands. See Surgical Diseases of the Skin and its Appendages; Carbuncle.
 Swelling of Navel. See Uterine Adnexa; Tumors of Ovaries.
 Swellings, Periosteal. See Syphilis.
 Swollen Upper Lip. See Yellow Fever.
 Sycosis. See Creasote; Skin Diseases—Eczema—Mercury; Oxides—Pix Liquida—Potassium; Chlorate—Salol—Sulphur; Cutaneous Disorders.
 Sycosis Non-parasitica. See Acne Rosacea.
 Sydenham's Chorea. See Chorea.
 Sydenham's Laudanum. See Opium.
 Symblepharon. See Palpebræ.
 Symblepharon Posterior. See Conjunctiva; Granular Conjunctivitis.
 Symorchism. See Penis and Testicles; Anomalies of Testicles.
 Sympathetic Ganglia. See Addison's Disease.
 Symphysiotomy. See Parturition, Abnormal.
 Symptomatic Parotitis. See Salivary Glands.
 Syncope. See Digitalis; Diseases of Heart—Epilepsy—Fatty Heart—Malarial Fevers; Pernicious—Menopause—Myocarditis—Nitrites; Cardiac Disorders—Pulmonary Circulation; Embolism—Scorbutus—Shock—Tuberculosis of Lungs; Chronic Ulcerative Phthisis—Valvular Diseases of Heart; Aortic Stenosis—Vasculo-Cardiac Neuroses; Slow Heart—Wounds and Injuries of Thorax; Hæmorrhage—Wounds and Injuries of Thorax; Mural Injuries.
 Syncope, Cardiac. See Physostigma; Poisoning.
 Syndrome, Griesinger's. See Vascular Diseases of Brain; Thrombosis.
 Synechia, Anterior. See Iris; Iritis.
 Synechia, Posterior. See Iritis; Papillary Membrane.
 Synovitis. See Joints—Petroleum; External Use—Scarlet Fever.
 Synovitis, Chronic. See Phenic (Carbolic) Acid; Surgical Disorders.
 Synovitis, Hip-joint. See Hip-joint Disease.
 Syphilide. See Syphilis—Thiol.
 Syphilide, Acneiform. See Acne Rosacea.
 Syphilide, Erythematous. See Dermatitis Exfoliativa—Dermatitis Medicamentosa.
 Syphilide, Papular. See Syphilis; General Infection—Syphilis; Syphilides.
 Syphilide, Papulo-Pustular. See Syphilis; Syphilides.
 Syphilide, Papulous-Squamous. See Syphilis; Syphilides.
 Syphilide, Precocious. See Syphilis; General Infection.
 Syphilide, Pustular. See Syphilis; Syphilides.
 Syphilide, Squamous. See Syphilis; Syphilides.
 Syphilide, Tubercular. See Strontium; Cutaneous Disorders—Syphilis; Period of Sequelæ—Syphilis; Syphilides.
 Syphilide, Ulcerative. See Syphilis; Syphilides.
 Syphilide, Ulcero-Crustaceous. See Syphilis; Syphilides.
 Syphilide, Vesicular. See Syphilis; Syphilides.
 SYPHILIS (*General Subject*). See Abortion—Acne—Actinomycosis—Adenitis—Animal Extracts; Thyroid—Erythema Multiforme—Erythema Nodosum—Euphorben; Venereal Disorders—Gold—Herpes Facialis—Herpes Genitalis—Hydrogen Dioxide—Internal Ear—Intertrigo—Iodine—Iodine; Soziodiol—Iron; Venereal Disorders—Keratitis—Interstitial—Leprosy—Liver; Tumors—Locomotor Ataxia—Mercury—Pseudoleukæmia—Psoriasis—Rheumatism; Acute—Rheumatism; Chronic Articular—Salicylic Acid; Mercuric Salicylate—Spine, Diseases of; Tuberculosis—Strontium; Cutaneous Disorders—Sulphur; Respiratory Disorders—Tendons; Bursitis—Thiol—Urinary System, Diseases of; Amyloid Kidney—Variola; Vaccinia.
 Syphilis, Cerebral. See Cerebral Syphilis (Index)—Hysteria—Insanity; General Paresis.
 Syphilis, Cerebro-Spinal. See Syphilis; Period of Sequelæ.
 Syphilis, Congenital. See Scorbutus, Infantile—Syphilis; Congenital.

- Syphilis, Crustaceous. See Syphilis; Syphilides.
 Syphilis, Gastric. See Syphilis; General Infection.
 Syphilis Hereditaria Tarda. See Syphilis; Congenital.
 Syphilis, Hereditary. See Syphilis; Congenital.
 Syphilis in Children, Acquired. See Syphilis; Congenital.
 Syphilis in Epididymis. See Syphilis; Period of Sequelæ.
 Syphilis, Infantile. See Syphilis; Congenital.
 Syphilis, Laryngeal. See Tracheo-Laryngeal Operations; Tracheotomy.
 Syphilis, Lesions of. See Creasote; Venereal Diseases.
 Syphilis of Brain. See Sclerosis of Brain.
 Syphilis of Eyelids. See Palpebræ, Diseases of.
 Syphilis of Hip. See Hip-joint Disease.
 Syphilis of Larynx. See Tumors of Larynx and Lungs; Carcinoma of Larynx.
 Syphilis of Liver, Gummatous. See Cirrhosis of the Liver; Portal.
 Syphilis of Nails. See Syphilis; General Infection.
 Syphilis of Rectum. See Dysentery.
 Syphilis of Stomach. See Syphilis; General Infection.
 Syphilis, Secondary. See Syphilis; General Infection.
 Syphilis, Tertiary. See Tuberculosis of Skin; Lupus Vulgaris.
 Syphilitic Alopecia. See Alopecia—Alopecia Areata—Syphilis; General Infection.
 Syphilitic Arthritis. See Joints, Surgical Diseases of.
 Syphilitic Cephalalgia. See Syphilis; Infectious Secretions.
 Syphilitic Condylomata. See Chronic Acid; Morbid Growths—Penis and Testicles; Tumors.
 Syphilitic Contraction of Muscles. See Muscles; Contracture.
 Syphilitic Disease of Conjunctiva. See Conjunctiva.
 Syphilitic Disease of Tongue. See Chronic Acid; Antiseptic.
 Syphilitic Ecthyma. See Syphilis; Syphilides.
 Syphilitic Epididymitis. See Penis and Testicles; Epididymitis.
 Syphilitic Eruptions. See Syphilis—Zinc; Cutaneous Disorders.
 "Syphilitic Germinal Cell" of Ovis. See Syphilis; Bacillus.
 Syphilitic Granuloma. See Syphilis; Primary Local Changes from Infection.
 Syphilitic Gumma. See Erythema Scrofulosorum—Syphilis.
 Syphilitic Insanity. See Insanity.
 Syphilitic Interstitial Keratitis. See Deaf-mutism; Abnormalities of Eye.
 Syphilitic Laryngitis. See Mercury; Chlorides; Local Uses—Syphilis.
 Syphilitic Leptomeningitis. See Meningitis.
 Syphilitic Meningitis. See Tumors of Brain.
 Syphilitic Neuritis. See Nerves, Peripheral; Multiple Neuritis.
 Syphilitic New Growths of Clitoris. See Clitoritis.
 Syphilitic Onychia. See Syphilis; General Infection.
 Syphilitic Orchitis. See Penis and Testicles; Orchitis.
 Syphilitic Pericellular Cirrhosis of Liver. See Cirrhosis of the Liver.
 Syphilitic Pharyngitis. See Tonsils; Syphilitic Pharyngitis.
 Syphilitic Phlebitis. See Syphilis; Period of Sequelæ.
 Syphilitic Reaction, Justus's. See Syphilis.
 Syphilitic Retinitis. See Optic Nerve and Retina; Retinitis.
 Syphilitic Roseola. See Syphilis; General Infection.
 Syphilitic Rupia. See Syphilis; Syphilides.
 Syphilitic Spinal Pachymeningitis. See Spinal Cord; Myelitis.
 Syphilitic Stricture of Œsophagus. See Stomach; Surgery of; Gastrostomy.
 Syphilitic Tumor of Liver. See Parasites; Echinococcus.
 Syphilitic Ulcer. See Mercury—Potassium; Sozodolate.
 Syphilitic Ulcer of Larynx. See Tuberculosis of Larynx.
 Syphilitic Ulcer of Rectum. See Rectum and Anus; Non-malignant Ulceration.
 Syphilitic Ulcer of Tongue. See Tongue; Ulceration.
 Syphilitic Vaginitis. See Vagina; Infectious Vaginitis.
 Syphilitic Vegetations of Glans. See Iron; Local Uses.
 Syphilitic Vegetations of Prepuce. See Iron; Local Uses.
 Syphilitic Vulvitis. See Vagina; Vulva; Infectious Vulvitis.
 Syphiloderma. See Hydrocyanic Acid; Cutaneous Disorders—Syphilis; Syphilides.
 Syphiloma. See Syphilis; Period of Sequelæ.
 Syringomyelia. See Hysteria—Leprosy—Rheumatism; Chronic Articular—Spinal Cord, Diseases of—Spine, Diseases of; Spina Bifida.
 Syringomyelia, Pseudoacromegalic. See Acromegaly.
 Syringomyelocoele. See Spine, Diseases of; Spina Bifida.
 Systolic Apex-murmur. See Valvular Diseases of Heart; Aortic Regurgitation.
 Systolic Murmurs. See Murmur; Systolic (Index).
 Tabes, Amaurotic. See Locomotor Ataxia.
 Tabes Dorsalis. See Diabetes Mellitus; Complications; Nervous System—Hypnotism; Organic Disease—Insanity; General Paresis—Locomotor Ataxia (Index)—Orthoform—Phenacetin—Rheumatism; Chronic Articular—Spinal Cord; Ataxic Paraplegia—Spinal Cord; Syringomyelia—Syphilis; Period of Sequelæ.
 Tabetie Arthropathy. See Joints; Charcot's Disease.
 Tabetie Crises. See Locomotor Ataxia.
 Table-salt. See Sodium.
 Tache Cérébrale. See Typhoid Fever.
 Tachycardia. See Animal Extracts; Thyroid; Untoward Effects—Exophthalmic Goitre—Menopause—Nerves, Peripheral; Localized Neuritis—Nerves, Peripheral; Multiple Neuritis—Vasculo-Cardiac Neuroses; Rapid Heart.
 Tænia Cucumerina. See Parasites; Intestinal; Tape-worms.
 Tænia Echinococcus. See Liver; Hydatid Cyst—Parasites; Echinococcus.
 Tænia Elliptica. See Parasites; Intestinal; Tape-worms.
 Tænia Mediocanellata. See Parasites; Intestinal; Tape-worms.
 Tænia Nana. See Parasites; Intestinal; Tape-worms.
 Tænia Saginata. See Parasites; Intestinal; Tape-worms.
 Tænia Solium. See Ailantus—Liver; Hydatid Cyst—Parasites; Intestinal; Tape-worms—Salicylic Acid—Tape-worm (Index).
 Tæniacide. See Strontium; Gastro-Intestinal Disorders—Thymol.
 Tæniuge. See Copper—Male Fern.
 Tainted Veal. See Toxic Foods; Ptomaines.
 Tait's Operation. See Vagino-Perineal Injuries; Flap-splitting Operation.
 Talipes. See Spinal Cord; Hereditary Ataxia.
 Talipes Calcaneus. See Orthopædic Surgery.
 Talipes Equino-Varus. See Orthopædic Surgery.
 Talipes Equinus. See Orthopædic Surgery—Spasms in Children; Tetany—Spinal Cord; Poliomyelitis.
 Talipes Varus. See Spinal Cord; Poliomyelitis.
 Tamponing, Nasal. See Epistaxis.
 Tan, Removal of. See Sodium; Cutaneous Disorders.
 Tannalbin. See Intestines; Colitis.
 Tannic Acid. See Krameria.
 Tannigen. See Infants, Diarrhoeal Diseases of.
 Tannin. See Hamamelis—Jaborandi—Potassium; Chlorate.
 Tanret's Test. See Albuminuria.
 Tape-worm. See Worms, Tape- (Index).
 Tape-worm, Beef. See Parasites; Tape-worms; Tænia Mediocanellata.
 Tape-worm, Pork. See Parasites; Tape-worms; Tænia Solium.
 Tapir-mouth. See Muscles; Dystrophies.
 Tapping of Chest. See Wounds and Injuries of Thorax; Operations.
 Tar. See Acne—Pix Liquida.
 Tar, Coal-. See Coal-tar (Index).
 Tar Eruption. See Dermatitis Venenata.
 Tar-acne. See Pix Liquida; Poisoning.
 Tar-camphor. See Naphthalin.

- Tarry Stools. See *Pix Liquida*; Poisoning.
 Tarsus, Dislocations of. See Dislocations.
 Tartar Emetic. See Potassium.
 Tartar Emetic, Poisoning by. See *Cholera Asiatica*.
 Tartaric Acid. See Piperazin; Lyceol.
 Taste, Perversions of. See Nerves, Peripheral; Localized Neuritis.
 Tattooing. See Cornea, Opacities of.
 Taxis. See Hernia.
 Tea, Excess in Use of. See Angina Pectoris.
 Teaberry. See *Gaultheria*.
 Teale's Operation. See *Palpebræ*; *Symbplepharon*.
 Teeth, Actinomyces in. See Actinomycosis.
 Teeth, Decalcification of. See Picric Acid.
 Teeth, Grinding of. See Insanity; General Paresis—Spasms in Children; Hysteria.
 Teeth, Hutchinson's. See Hutchinson's Teeth (Index)—Syphilis—Syphilis; Congenital.
 Teeth, Loosened. See Scorbutus.
 Telangiectasis. See Tumors.
 Telangiectatic Sarcoma. See Tumors.
 Telephone Probe, Girdner's. See Wounds of Head; Gunshot Wounds.
 Temporo-Sphenoidal Lobe, Tumors of. See Tumors of Brain.
 Tendons and Fascia, Contraction of. See Tendons; Contraction.
 TENDONS, BURSÆ AND FASCIÆ, DISEASES OF (*General Subject*).
 Tendons, Displacement of. See Tendons; Wounds and Injuries.
 Tendons, Injuries of. See Tendons; Wounds and Injuries.
 Tendons, Rupture of. See Tendons; Wounds and Injuries.
 Tendons, Wounds and Injuries. See Tendons.
 Tendons, Wounds of. See Tendons; Wounds and Injuries.
 Tendo-vaginitis. See Sulphur; Respiratory Disorders.
 Tenesmus. See Dysentery—Infants, Diarrhœal Diseases of—Intestines: Colitis—Obstruction, Intestinal—Potassium; Chlorate—Quinine; Tonic—Tumors of Rectum and Anus; Benign.
 Tenesmus, Rectal. See Locomotor Ataxia.
 Tenesmus, Vesical. See Vesical Tenesmus (Index).
 Tenonitis. See Orbit; Orbital Cellulitis.
 Tenosynovitis. See Tendons.
 Tenotomy. See Orthopædic Surgery—Strabismus.
 Tension of Eyeball, Diminished. See Tension of Eyeball.
 TENSION OF EYEBALL, DISORDERS OF (*General Subject*).
 Teratoid Tumors. See Tumors.
 Teratoma of Ovary. See Uterine Adnexa; Tumors of Ovaries.
 Terchmann's Test. See Hematuria.
 Teratomata of Rectum. See Tumors of Rectum and Anus; Benign.
 Terebene. See Turpentine.
 Terebenum. See Turpentine.
 Terebinthina. See Turpentine.
 Terebinthina Canadensis. See Turpentine.
 Terminal Infections. See Specific Infectious Fevers.
 Terpin Hydrate. See Turpentine.
 Terpine Hydras. See Turpentine.
 Tertian Fever. See Malarial Fevers.
 Tertian Fever, Malignant. See Malarial Fevers; Estivo-Autumnal.
 Tertian Parasite. See Malarial Fevers.
 Tertiary Syphilis. See Tuberculosis of Skin; Lupus Vulgaris.
 Test, Græfe. See Strabismus.
 Test, Maddox Rod-. See Strabismus.
 Testes, Retraction of. See Urinary System, Diseases of (Surgical); Renal Calculus.
 Testicles. See Penis and Testicles.
 Testicles, Analgesia of. See Locomotor Ataxia.
 Testicles, Atrophy of. See Iodine; Iodism—Penis and Testicles; Anomalies of Testicles.
 Testicles, Carcinoma of. See Penis and Testicles; Tumors of Testicles.
 Testicles, Chondromata of. See Penis and Testicles; Tumors of Testicles.
 Testicles, Diseases of the. See Penis and Testicles.
 Testicles, Hypertrophy. See Penis and Testicles; Anomalies of Testicles.
 Testicles, Injuries of. See Penis and Testicles.
 Testicles, Inversion of. See Penis and Testicles.
 Testicles, Luxation of. See Penis and Testicles.
 Testicles, Myxomata of. See Penis and Testicles; Tumors of Testicles.
 Testicles, Sarcomata of. See Penis and Testicles; Tumors of Testicles.
 Testicles, Swelling of. See Specific Infectious Fevers; Malta.
 Testicles, Torsion of. See Penis and Testicles.
 Testicles, Tumors of. See Penis and Testicles—Penis and Testicles; Tumors of Testicles.
 Testicles, Undescended. See Penis and Testicles; Anomalies of Testicles.
 Testicular Extract. See Animal Extracts.
 Testis, Atrophy of. See Hernia; Inguinal.
 Testis, Irritable. See Neuralgia; Lumbar.
 Tetanic Bacillus. See Tetanus.
 Tetanic Convulsions. See Nux Vomica; Poisoning—Strychnine; Physiological Action.
 Tetanic Spasm. See Spasm, Tetanic (Index).
 TETANUS (*General Subject*). See Abortion—Barium—Bromides, Chorea, etc.—Burns—Cannabis Indica—Chloral—Epilepsy—Fractures—Lobelia—Meningitis; Leptomenigitis—Nitrites; Nervous Disorders—Phenic (Carbolic) Acid; Surgical Disorders—Physostigma; Spasmodic Disorders—Rabies—Uræmia.
 Tetanus Antitoxin. See Tetanus.
 Tetanus, Head. See Tetanus.
 Tetanus, Idiopathic. See Strychnine; Nervous Disorders—Tetanus.
 Tetanus Neonatorum. See Tetanus.
 Tetanus, Traumatic. See Curara—Tetanus.
 Tetany. See Animal Extracts; Thyroid—Infants, Diarrhœal Diseases of—Pregnancy, Disorders of—Spasms in Children—Status Lymphaticus—Tetanus.
 Thallin. See Choluria.
 Thapsia Eruption. See Dermatitis Venenata.
 Thebaine. See Opium.
 Thecitis. See Tendons; Tenosynovitis.
 Thenar Muscles, Wasting of. See Spinal Cord; Amyotrophic Sclerosis.
 Thermic Fever. See Insolation.
 Thermo-anæsthesia. See Spinal Cord; Syringomyelia.
 Thermocautery. See Dermatitis Maligna—Glanders.
 Thermocautery, Paquelin's. See Petroleum; Rhigolene.
 Thielemann's Cholera Drops. See Opium.
 Thiersch's Method of Skin-grafting. See Skin-grafting.
 Thiersch's Operation. See Neuralgia—Urinary System, Surgical Diseases of; Epispadias.
 Thiersch's Solution. See Salicylic Acid.
 Thigh, Paresis of Left. See Diabetes Mellitus.
 Thighs, Fusiform Swelling of. See Scorbutus; Infantile.
 THIOI (*General Subject*).
 Thio-resorcin. See Resorcin.
 Third Nerve, Paralysis of. See Tumors of Brain; Tumors of Crus.
 Thirst, Excessive. See Hernia; Diaphragmatic.
 Thomas Hip-splint. See Hip-joint Disease.
 Thompson's Solution. See Phosphorus; Cutaneous Disorders.
 Thomsen's Disease. See Muscles; Myotonia.
 Thoracentesis. See Empyema—Wounds and Injuries of Thorax; Operations.
 Thoracic Aneurism. See Valvular Diseases of Heart; Aortic Stenosis.
 Thoracic Dropsy. See Pleura; Hydrothorax.
 Thoracic Duct, Injuries of. See Mediastinum.
 Thoracic Empyema. See Empyema (Index).
 Thoracic Vessels, Injuries to. See Wounds and Injuries of Thorax; Injuries to Mediastinum.
 Thoracic Viscera, Injuries of. See Wounds and Injuries of Thorax.
 Thoracic Viscera, Wounds of. See Wounds and Injuries of Thorax.
 Thoracoplasty. See Empyema.
 Thoracotomy. See Empyema—Wounds and Injuries of Thorax; Operations.
 Thoraplasty. See Wounds and Injuries of Thorax.
 Thorax. See Chest (Index).
 Thorax and Neck, Injuries of. See Wounds and Injuries of Chest.
 Thorax, Barrel-shaped. See Tumors of Larynx and Lungs; Sarcoma of Lungs.
 Thorax, Boat-shaped Deformity of. See Spinal Cord; Syringomyelia.
 Thorax, Deformity of. See Acromegaly.

- Thorax, Diffuse Phlegmon of. See Wounds and Injuries of Thorax; Secondary Complications.
- Thorax, Dislocations of Bones of. See Wounds and Injuries of Thorax; Fractures.
- Thorax, Fractures of Bones of. See Wounds and Injuries of Thorax; Fractures.
- Thorax, Injuries of. See Pulmonary Circulation; Hæmorrhage—Wounds and Injuries of Thorax.
- Thorax, Operations upon. See Wounds and Injuries of Thorax.
- Thorax, Wounds of. See Wounds and Injuries of Thorax.
- Thread-operation. See Strabismus.
- Thread-worms. See Worms, Thread- (Index).
- Throat, Herpes of. See Herpes.
- Throat, Inflammation of. See Petroleum; External Use.
- Throat, Mucous Patches in. See Tonsils; Syphilitic Pharyngitis.
- Throat, Edema of. See Parotitis; Infectious.
- Throat, Operations upon. See Chloroform; Method of Administration.
- Throat, Relaxed Conditions of. See Kino.
- Throat, Stiffness of. See Strychnine; Physiological Action.
- Throat Neurosis. See Menopause.
- Thrombo-arteritis. See Vascular System; Arteritis.
- Thrombosis. See Cerebral Hæmorrhage — Diphtheria — Pregnancy, Disorders of — Vagina; Vulva; Varicocele — Vascular Diseases of Brain — Vascular System; Varix — Vascular System; Vascular Obstruction—Vascular System; Vascular Obstruction; Embolism.
- Thrombosis, Arterial. See Arterial Thrombosis (Index).
- Thrombosis, Capillary. See Vascular System; Vascular Obstruction; Thrombosis.
- Thrombosis, Cardiac. See Vascular System; Vascular Obstruction; Thrombosis.
- Thrombosis, Lymphatic. See Vascular System; Vascular Obstruction; Thrombosis.
- Thrombosis of Brain. See Vascular Diseases of Brain; Thrombosis of Sinuses.
- Thrombosis of Brain-veins. See Vascular Diseases of Brain.
- Thrombosis of Central Retinal Artery. See Optic Nerve and Retina.
- Thrombosis of Central Retinal Vein. See Optic Nerve and Retina.
- Thrombosis of Mesenteric Blood-vessels. See Stomach; Surgery of; Intestines.
- Thrombosis of Ophthalmic Veins. See Typhoid Fever.
- Thrombosis of Orbital Veins. See Typhoid Fever.
- Thrombosis of Splenic Artery. See Spleen; Infarcts.
- Thrombosis, Portal. See Cirrhosis of the Liver; Portal.
- Thrombosis, Sinus-. See Vascular Diseases of Brain; Thrombosis—Vascular Diseases of Brain; Thrombosis of Brain-veins.
- Thrombosis, Therapeutic. See Erythroxylin Coca.
- Thrombosis, Venous. See Typhoid Fever—Vascular Diseases of Brain; Thrombosis — Vascular System; Vascular Obstruction; Thrombosis.
- Thrombus. See Aneurism—Vascular System; Phlegmasia Alba Dolens—Vascular System; Vascular Obstruction; Thrombosis.
- Thrush. See Mouth; Parasitic Stomatitis—Esophagus; Esophagitis—Salicylic Acid.
- Thumb, Dislocations of. See Dislocations.
- Thymacetin. See Phenacetin—Thymol.
- Thyme, Oil of. See Thymol.
- Thyme-camphor. See Thymol.
- Thymic Acid. See Thymol.
- THYMOL (*General Subject*). See Parasites; Intestinal; Anchylostoma — Phenacetin; Thymacetin.
- Thymol Poisoning. See Thymol.
- Thymus, Enlarged. See Status Lymphaticus.
- Thymus Gland. See Acromegaly—Animal Extracts — Goitre.
- Thymus Gland, Disorders of. See Infantile Myxœdema.
- Thymus Gland, Hyperplasia of. See Status Lymphaticus.
- Thyro-antitoxin. See Animal Extracts; Thyroid.
- Thyroarytenoid Muscles, Paralysis of. See Respiratory Organs; Laryngeal Neuroses.
- Thyroid, Adenoma of. See Goitre.
- Thyroid Bodies, Accessory. See Goitre.
- Thyroid, Cancer of. See Thyroid Gland; Tumors.
- Thyroid, Carcinoma of. See Goitre.
- Thyroid Extract. See Tuberculosis of Skin; Lupus Vulgaris.
- Thyroid Fever. See Thyroid Gland.
- Thyroid Gland. See Exophthalmic Goitre (Index) — Goitre (Index).
- Thyroid Gland, Abscess of. See Goitre.
- Thyroid Gland, Adenoma of. See Goitre.
- Thyroid Gland, Atrophy of. See Myxœdema.
- Thyroid Gland, Carcinoma of. See Goitre.
- Thyroid Gland, Cysts of. See Goitre.
- THYROID GLAND, DISEASES OF (*General Subject*).
- Thyroid Gland, Disorders of. See Infantile Myxœdema.
- Thyroid Gland, Enlargement of. See Goitre.
- Thyroid Gland, Extirpation of. See Exophthalmic Goitre.
- Thyroid-Gland Extract. See Acromegaly—Agalactia — Alopecia — Animal Extracts — Fatty Heart — Goitre.
- Thyroid Gland, Fibroma of. See Goitre.
- Thyroid Gland, Growths of. See Aneurism; Carotid.
- Thyroid Gland, Hæmorrhage of. See Goitre.
- Thyroid Gland, Puncture of. See Goitre.
- Thyroid Gland, Sarcoma of. See Goitre — Thyroid Gland; Tumors.
- Thyroid Gland, Swelling of. See Status Lymphaticus.
- Thyroid-Gland Therapy. See Infantile Myxœdema — Myxœdema—Psoriasis.
- Thyroid Gland, Tumors of. See Thyroid Gland; Tumors.
- Thyroidal Fibrosis. See Myxœdema.
- Thyroidectomy. See Exophthalmic Goitre.
- Thyroidectomy, Partial. See Thyroid Gland; Thyroid Fever.
- Thyroidectomy, Seizures After. See Bromides; Chorea, etc.
- Thyroidin. See Animal Extracts; Thyroid.
- Thyroiditis. See Thyroid Gland.
- Thyroiditis, Acute Suppurative Interstitial. See Goitre.
- Thyro-iodine. See Animal Extracts; Thyroid—Infantile Myxœdema—Myxœdema.
- Thyrotomy. See Tracheo-Laryngeal Operations.
- Tibia, Dislocations of. See Dislocations.
- Tibia, Fractures of. See Fractures.
- Tic. See Phosostigma; Spasmodic Disorders.
- Tic Convulsif. See Chorea — Spasms in Children; Automatic Movements.
- Tic Co-ordiné. See Chorea.
- Tic Douloureux. See Neuralgia; Fifth Pair.
- Tinea. See Creasote; Skin Diseases—Thiol.
- Tinea Capitis. See Pix Liquida; Cutaneous Disorders.
- Tinea Circinata. See Erythema Multiforme—Phenic (Carbolic) Acid; Cutaneous Disorders.
- Tinea Tarsi. See Blepharitis.
- Tinea Tonsurans. See Alopecia Areata — Anthra-robin—Mercury; Oxides—Phenic (Carbolic) Acid; Cutaneous Disorders—Potassium; Dithiocarbonate—Sulphur; Cutaneous Disorders.
- Tinea Tricophytina. See Copper; Skin Diseases.
- Tinea Versicolor. See Resorcin—Sodium; Cutaneous Disorders.
- Tinglings. See Vascular Diseases of Brain; Thrombosis.
- Tinnitus Aurium. See Bright's Disease; Non-exudative Chronic — Buzzing in Ears (Index) — Cantharides; Ear Diseases—Gaultheria; Poisoning—Hypertrophy of the Heart — Internal Ear — Iodine; Iodism — Lead; Chronic Poisoning—Leukæmia — Middle Ear; Acute Otitis — Naso-pharynx; Acute Naso-pharyngitis — Neurasthenia — Quinine; Physiological Action—Spasms in Children; Tetany — Sulphonal; Poisoning — Thymol; Physiological Action—Uræmia—Vasculo-Cardiac Neuroses; Slow Heart.
- Tobacco. See Toxic Foods; Grain Poisoning.
- Tobacco, Excess in Use of. See Angina Pectoris.
- Tobacco, Indian. See Lobelia.
- Tobacco-amaurosis. See Nux Vomica.
- Tobacco-amblyopia. See Amblyopia, Tobacco- (Index).
- Toe, Displacement Outward of Great. See Orthopaedic Surgery; Hallus Valgus.
- Toe, Pain in Big. See Hip-joint Disease.
- Toe-nail, Ingrowing. See Ethyl-chloride — Nails — Potassium; Caustics.
- Toes, Clucking of. See Pleurisy; Chronic.
- Tokay. See Alcohol.
- Tolipyrin Salicylate. See Salicylic Acid.

- Toluene. See Benzoic Acid.
 Toluylendiamin, Poisoning by. See Jaundice; Toxæmia.
 Tolylantipyrine Salicylate. See Salicylic Acid; Tolipyrin Salicylate.
 Tolysal. See Salicylic Acid; Tolipyrin Salicylate.
 Tongue, Actinomycosis of. See Actinomycosis.
 Tongue, Adenomata of. See Tongue; Tumors.
 Tongue, Angiomata of. See Tongue; Tumors.
 Tongue, Black. See Boracic Acid; Sodium Baborate.
 Tongue, Cancer of. See Cancer of Tongue (Index) —Tongue; Cancer.
 Tongue, Cancerous Ulcer of. See Tongue; Ulceration.
 Tongue, Cystomata of. See Tongue; Tumors.
 TONGUE, DISEASES OF (*General Subject*).
 Tongue, Enlargement of. See Infantile Myxœdema.
 Tongue, Epithelioma of. See Tongue; Cancer.
 Tongue, Epitheliomatous Cancer of. See Tongue; Leukoplakia.
 Tongue, Fibrillary Tremor of. See Nerves, Peripheral; Localized Neuritis.
 Tongue, Fibromata of. See Tongue; Tumors.
 Tongue, Fissures of. See Silver; Surgical Disorders.
 Tongue, Gouty Disease of. See Chronic Acid; Antiseptic.
 Tongue, Inflammation of. See Tongue; Glossitis.
 Tongue, Injuries of. See Tongue; Injuries.
 Tongue, Kocher's Operation for Excision of. See Tongue; Cancer.
 Tongue, Mother-of-pearl-like. See Plague.
 Tongue, Myxoma of. See Tongue; Tumors.
 Tongue, Papillomata of. See Tongue; Tumors.
 Tongue, Paralysis of. See Hysteria; Motor Symptoms—Nerves, Peripheral; Localized Neuritis.
 Tongue, Sarcomata of. See Tongue; Tumors.
 Tongue, Sclerosis of. See Influenza.
 Tongue, Spasm of. See Encephalitis; Acute Non-suppurative.
 Tongue, Strawberry. See Scarlet Fever.
 Tongue, Syphilitic Disease of. See Chronic Acid; Antiseptic.
 Tongue, Syphilitic Ulceration of. See Tongue; Ulceration.
 Tongue, Tremulous. See Typhoid Fever.
 Tongue, Tuberculous Ulceration of. See Tongue; Ulceration.
 Tongue, Tumors of. See Tongue; Tumors.
 Tongue, Ulceration of. See Tongue; Ulceration.
 Tongue-like Lobes of Liver. See Liver.
 Tongue-tie. See Tongue, Diseases of.
 Tonic. See Apocynum Cannabinum—Arsenic—Certum—Chaulmugra-oil—Cimicifuga—Cinchona—Gentian—Gold—Hamamelis—Hydrastis—Hydrochloric Acid—Iron—Mace—Manganese—Mercury—Nitric Acid—Nux Vomica—Phosphoric and Hypophosphorous Acids—Phosphorus—Quinine—Salicylic Acid; Ferric Salicylate—Strontium; Gastro-Intestinal Disorders.
 Tonic Contraction of Muscles. See Sulphur; Poisoning.
 Tonic, Nervous. See Silver.
 Tonic Spasms. See Spasm, Tonic (Index).
 Tonsillar Diphtheria. See Diphtheria.
 Tonsillitis. See Alumol; Laryngology—Antipyrine—Asaprol; Diseases of Respiratory Tract—Diphtheria—Guaiaicol; Painful Disorders—Laryngitis; Edema—Leukæmia—Myocarditis—Pericarditis; Pericarditis—Rheumatism; Acute—Scarlet Fever—Tonsils.
 Tonsillitis, Acute. See Guaiaic—Quinine; Inflammation—Sodium; Laryngological Disorders.
 Tonsillitis, Croupous. See Tonsils; Tonsillitis.
 Tonsillitis, Follicular. See Benzoic Acid—Glycerin—Petroleum; Disorders of Respiratory Tract—Tonsils; Tonsillitis.
 Tonsillitis, Parenchymatous. See Salicylic Acid.
 Tonsillitis, Phlegmonous. See Tonsils; Tonsillitis.
 TONSILS AND PHARYNX, DISEASES OF (*General Subject*).
 Tonsils, Enlarged. See Croup; Catarrhal—Hydrochloric Acid—Status Lymphaticus.
 Tonsils, Herpes of. See Herpes.
 Tonsils, Hypertrophied. See Deaf-mutism—Tonsils; Hypertrophy.
 Tonsils, Inflammation of. See Muscles; Torticollis—Tonsils; Tonsillitis.
 Tonsils, Membranous Exudate on. See Scarlet Fever; Severe.
 Tonsils, Ulcers of. See Sodium; Gastro-Intestinal Disorders.
 Tooth Tumors. See Tumors; Connective Tissue.
 Toothache. See Camphor; Phenicated—Lupulus; External Uses—Mentha—Neuralgia; Fifth Pair—Orthoform—Phenic (Carbolic) Acid; Oral Disorders—Salol; Camphorated—Salophen.
 Tophi. See Gout.
 Topalgia. See Neurasthenia.
 Tormina Ventriculi Nervosa. See Stomach, Diseases of; Functional; Motor Neuroses.
 Torpid Liver. See Liver, Torpid (Index).
 Torpidity, Mental. See Wounds (Septic) and Gangrene; Septicæmia.
 Torpor, General Systemic. See Oxygen; Oxygen-water.
 Torsion of Arteries. See Vascular System; Injuries of Arteries; Rupture.
 Torticollis. See Animal Extracts; Thyroid—Gelsemium; Spasmodic Disorders—Hysteria—Muscles, Surgical Diseases of—Naso-pharynx; Adenoids—Rheumatism; Muscular—Spine, Diseases of; Tuberculosis—Wryneck (Index).
 Total Hysterectomy, Abdominal. See Uterus; Myoma.
 Toxæmia. See Alcohol; Poisoned Wounds—Diphtheria—Eclampsia—Epilepsy—Hysteria—Insanity; Acute Confusional—Insanity; Post-febrile—Insanity; Puerperal—Jaundice; Toxæmia—Leukæmia—Myxœdema—Nerves, Peripheral; Multiple Neuritis—Spleen; Hyperæmia—Vascular System; Phlegmasia Alba Dolens—Wounds (Septic); Gangrene—Wounds (Septic) and Gangrene; Septicæmia.
 Toxæmia, Saturnine. See Lead; Chronic Poisoning.
 Toxæmic Jaundice. See Jaundice.
 TOXIC AMBLYOPIA (*General Subject*).
 Toxic Erythema. See Erythema Multiforme.
 TOXIC FOODS (*General Subject*).
 Toxic Gastritis. See Stomach, Diseases of.
 Toxic Hysterical Paralysis. See Alcoholic Neuritis.
 Toxic Oyster. See Toxic Foods; Ptomaines.
 Toxin Poisoning. See Stomach; Surgery of; Intestines; Enterotomy.
 Toxins. See Toxic Foods.
 Toxins, Erysipelas. See Erysipelas Toxins (Index).
 Toxins of Erysipelas and Bacillus Prodigiosus, Coley's. See Tumors; Cysts.
 Trachea, Diseases of. See Pulmonary Circulation; Hæmorrhage.
 Trachea, Fracture of. See Fractures.
 Tracheal Stenosis. See Leukæmia.
 TRACHEO-LARYNGEAL OPERATIONS (*General Subject*).
 Tracheotomy. See Aneurism—Croup; Membranous—Diphtheria—Intubation—Laryngitis; Edema—Respiratory Organs; Larynx—Tracheo-Laryngeal Operations—Tumors of Larynx and Lungs; Carcinoma of Larynx.
 Trachoma. See Chronic Acid—Conjunctiva; Granular Conjunctivitis—Formaldehyde; Ophthalmic Disorders—Iodine—External Use—Keratitis; Pannus—Methyl-blue—Silver; Ophthalmic Disorders.
 Trachoma of Larynx. See Laryngitis; Chronic.
 Traction. See Fractures—Hip-joint Disease.
 Tragacanth Dressing. See Eczema.
 Trajector, Morgan's. See Wounds of Head; Gun-shot Wounds.
 Trajector, Winter's. See Wounds of Head; Gun-shot Wounds.
 Trance. See Catalepsy—Hysteria.
 Transfusion. See Hæmophilia.
 Transient Albuminuria. See Syphilis; General Infection.
 Transient Hemiplegia. See Vascular System; Arteriosclerosis.
 Transitory Paræsthesia. See Vascular Diseases of Brain; Thrombosis.
 Transplantation. See Plastic Surgery.
 Transudation, Serous. See Vascular System; Vascular Obstruction; Thrombosis.
 Transverse Colon, Tumors of. See Liver; Cancer of Gall-bladder.
 Transverse Myelitis. See Myelitis, Transverse (Index).
 Trapezium Muscle, Paralysis of. See Nerves, Peripheral; Localized Neuritis.
 Trapezus Muscle, Weakness of. See Nerves, Peripheral; Localized Neuritis.

- Traube, Pulsus Alternans of. See Vasculo-Cardiac Neuroses; Irregular Heart.
- Traube's Free Spot. See Empyema.
- Traumatic Aneurism. See Aneurism.
- Traumatic Cerebral Œdema. See Wounds of Head; Wounds of Brain.
- Traumatic Delirium. See Delirium, Traumatic (Index)—Surgical Diseases.
- Traumatic Dermatitis. See Dermatitis Traumatica.
- Traumatic Fever. See Surgical Diseases—Surgical Diseases; Primary Wound Fever.
- Traumatic Gangrene. See Wounds (Septic); Gangrene.
- Traumatic Intracranial Hæmorrhage. See Wounds of Head; Diseases Involving Skull.
- Traumatic Keratitis. See Keratitis.
- Traumatic Tetanus. See Tetanus.
- Traumatic Vaginitis. See Vagina.
- Traumatic Vulvitis. See Vagina; Vulva; Vulvitis.
- Traumatopnea. See Wounds and Injuries of Thorax; Pneumothorax—Wounds and Injuries of Thorax; Wounds of Lung.
- Treatment, Cold Bath. See Typhoid Fever.
- Treatment, Woodbridge. See Typhoid Fever.
- Trematodes. See Parasites.
- Trembles in Animals. See Milk-sickness.
- Tremblings, Muscular. See Encephalitis; Acute Non-suppurative.
- TREMORS (*General Subject*). See Exophthalmic Goitre—Hydrocephalus; Acute—Hysteria—Insanity—Insanity; General Paresis—Mercury—Morphinomania—Nerves, Peripheral; Functional Disorders—Neurasthenia—Piperazin; Poisoning—Spasms in Children; Tetany—Spinal Cord; Amyotrophic Sclerosis—Spinal Cord; Hereditary Ataxia—Strychnine; Nervous Disorders—Thyroid Gland; Thyroid Fever—Tumors of Brain; Tumors of Great Ganglia.
- Tremors, Alcoholic. See Tremors; Tremor.
- Tremors, Intention. See Sclerosis of Brain.
- Tremors, Muscular. See Sulphonals; Poisoning—Typhoid Fever.
- Tremors, Senile. See Tremors; Tremor.
- Tremors, Volitional. See Sclerosis of Brain.
- Tremulous Tongue. See Typhoid Fever.
- Trendelenburg Position. See Ether—Parturition, Abnormal.
- Trephining. See Cerebral Abscess—Cerebral Hæmorrhage—Encephalitis; Suppurative—Epilepsy—Head, Injuries of—Hydrocephalus; Chronic—Meningitis; Leptomeningitis.
- Tribromacetyl-oxide. See Bromides.
- Tribromaldehyde. See Bromides.
- Tribromophenol. See Bromides—Phenic (Carbolic) Acid; Bromol—Phenic (Carbolic) Acid; Bromol.
- Trichiasis. See Palpebræ.
- Trichina Spiralis. See Parasites.
- Trichiniasis. See Parasites; Trichina—Parasites; Trichina Spiralis.
- Trichinosis. See Beriberi—Muscles; Infectious Myositis—Parasites; Trichina Spiralis—Toxic Foods; Ptomaines.
- Trichlorophenol. See Phenic (Carbolic) Acid.
- Trichocephalus Dispar. See Parasites; Intestinal.
- Trichomania of Besnier. See Alopecia.
- Trichophytosis. See Alopecia Areata.
- Tricresol. See Phenic (Carbolic) Acid; Trikresol.
- Tricuspid Regurgitation. See Hypertrophy of Heart—Myocarditis—Valvular Diseases of Heart; Aortic Stenosis.
- Tricuspid Stenosis. See Valvular Diseases of Heart; Mitral Stenosis—Valvular Diseases of Heart; Tricuspid Stenosis.
- Trifacial Neuralgia. See Neuralgia; Fifth Pair.
- Triformol. See Formaldehyde.
- Trigger-finger. See Tendons; Contraction.
- Trikresol. See Phenic (Carbolic) Acid.
- Trimethyl-ethylene. See Pental.
- Trinitrin. See Nitroglycerin.
- Trinitrophenol. See Picric Acid.
- Trional. See Insanity.
- Tri-oxy-benzophenone. See Salicylic Acid; Salicyl-resorcin.
- Trioxymethylene. See Formaldehyde.
- Trismus. See Chloral—Musk—Spasms in Children; Tetany—Strychnine; Poisoning—Tetanus.
- Trismus Neonatorum. See Tetanus.
- Trismus Neonatorum. See Physostigma; Spasmodic Disorders.
- Trochisci Ammonii Chloridi. See Licorice.
- Trochisci Glycyrrhizæ et Opii. See Licorice.
- Trochowonick Dietetics. See Parturition, Abnormal.
- Tropic Acid. See Hyoscyamus.
- Tropical Abscess. See Liver; Abscess.
- Tropical Chyluria. See Chyluria.
- Tropical Dysentery. See Dysentery.
- Tropical Fever. See Copper; Malarial Fevers.
- Tropical Fevers. See Specific Infectious Fevers.
- Tropine. See Homatropine—Hyoscyamus.
- Trousseau's Symptom. See Spasms in Children; Tetany.
- "True Image." See Strabismus.
- Trunk, Paralysis of. See Diphtheria.
- Trunk, Rhythmic Movements of. See Hysteria.
- Trusses. See Hernia.
- Trypsin. See Pancreatin.
- Tubage of Œsophagus. See Œsophagus; Stricture.
- Tubal Sac, Extirpation of. See Uterine Adnexa; Inflammation of Tubes.
- Tubercle. See Leprosy—Syphilis; General Infection—Syphilis; Primary Local Changes from Infection.
- Tubercle, Anatomical. See Tuberculosis of Skin; Lupus Erythematosus.
- Tubercle Bacilli in Urine. See Urine, Tubercle Bacilli in (Index).
- Tubercle Bacillus. See Cystitis—Pleurisy; Acute—Pneumonia, Catarrhal—Tuberculosis of Lungs.
- Tubercle, Mucous. See Syphilis; General Infection.
- Tubercle of Spinal Cord. See Spine, Diseases of; Tumors.
- Tubercle of Spleen. See Spleen; Tuberculosis.
- Tubercle, Warty. See Surgical Diseases of the Skin and its Appendages; Verruæ.
- Tubercular Arthritis. See Joints.
- Tubercular Cavities of Lung. See Wounds and Injuries of Thorax; Pneumotomy.
- Tubercular Cerebro-Spinal Leptomeningitis. See Meningitis.
- Tubercular Cystitis. See Cystitis, Tubercular (Index).
- Tubercular Disease of the Conjunctiva. See Conjunctiva.
- Tubercular Epididymitis. See Penis and Testicles; Epididymitis.
- Tubercular Eruption. See Dermatitis Medicamentosa.
- Tubercular Growths. See Europhen; Cutaneous Disorders.
- Tubercular Joint Disease. See Joint Tuberculosis (Index).
- Tubercular Laryngitis. See Laryngitis, Tubercular (Index).
- Tubercular Leprosy. See Leprosy.
- Tubercular Leptomeningitis. See Meningitis.
- Tubercular Mastitis. See Tumors of Breast; Tuberculosis.
- Tubercular Meningitis. See Tumors of Brain.
- Tubercular Neuritis. See Nerves, Peripheral; Multiple Neuritis.
- Tubercular Orchitis. See Penis and Testicles; Orchitis.
- Tubercular Peritonitis. See Cirrhosis of the Liver; Portal.
- Tubercular Spinal Pachymeningitis. See Spinal Cord; Myelitis.
- Tubercular Syphilide. See Syphilide, Tubercular (Index).
- Tubercular Ulceration of Rectum. See Rectum and Anus; Non-malignant Ulceration.
- Tuberculin. See Tuberculosis of Skin; Lupus Vulgaris.
- Tuberculin, Koch's New T. R. See Tuberculosis of Skin; Lupus Vulgaris.
- Tuberculin-R. See Tuberculosis of Lungs; Semi-specifics.
- Tuberculous, Suppurative. See Tuberculosis of Skin; Lupus Erythematosus.
- Tuberculosis. See Actinomycosis—Adenitis—Alcoholism; Chronic; Lungs—Cinnamon—Cirrhosis of the Liver; Portal—Copper—Gout—Guaiacol—Hydrocephalus; Acute—Indicanuria—Infants, Diarrhoeal Diseases of; Chronic—Influenza—Leprosy—Malt—Measles—Meningitis—Nursing and Artificial Feeding; Nursing—Pancreatin—Phenacetin—Lactophenin—Phenic (Carbolic) Acid; Chlorphenol—Pleurisy; Acute—Pleurisy; Chronic—Potassium; Cantharidate—Rheumatism; Acute—Rheumatism; Chronic Articular—Specific Infectious Fevers; Terminal Infections—Sulphur; Fumigation—Thiol—Toxic Foods;

- Ptomaines — Tumors; Carcinoma — Typhoid Fever; Complications — Urinary System, Diseases of; Amyloid Kidney — Variola; Vaccinia.
- Tuberculosis, Abdominal. See Creasote; Pulmonary Diseases.
- Tuberculosis, Acute Miliary. See Specific Infectious Fevers; Terminal Infections — Typhus Fever.
- Tuberculosis, Adrenal. See Addison's Disease.
- Tuberculosis, Anatomical. See Surgical Diseases of the Skin and its Appendages; Verruæ.
- Tuberculosis, Bone. See Osseous System — Osseous System; Bone Tuberculosis.
- Tuberculosis, Congenital. See Tuberculosis of Lungs.
- Tuberculosis, Hereditary. See Tuberculosis of Lungs.
- Tuberculosis, Hip-joint. See Hip-joint Disease.
- Tuberculosis, Intestinal. See Stomach; Surgery of; Intestines; Resection.
- Tuberculosis, Joint. See Joint Tuberculosis (Index).
- Tuberculosis, Laryngeal. See Laryngeal Tuberculosis (Index).
- Tuberculosis, Lymph-. See Pseudoleukæmia.
- Tuberculosis, Miliary. See Tuberculosis of Lungs; Roentgen Rays.
- Tuberculosis of Breast. See Tumors of Breast; Tuberculosis.
- Tuberculosis of Cervix Uteri. See Uterus; Tuberculosis.
- Tuberculosis of Kidney. See Kidney, Tuberculosis of (Index).
- TUBERCULOSIS OF LARYNX (*General Subject*). See Larynx, Tuberculosis of (Index).
- TUBERCULOSIS OF LUNGS (*General Subject*). See Lungs, Tuberculosis of (Index).
- Tuberculosis of Penis. See Penis and Testicles.
- Tuberculosis of Prostate. See Urinary System, Surgical Diseases of.
- TUBERCULOSIS OF SKIN (*General Subject*). Tuberculosis of Skin, Miliary. See Tuberculosis of Skin.
- Tuberculosis of Ureter. See Urinary System, Diseases of (Surgical); Ureterectomy.
- Tuberculosis of Uterus. See Endometritis — Uterus.
- Tuberculosis, Pulmonary. See Pulmonary Tuberculosis (Index).
- Tuberculosis, Renal. See Kidney, Tuberculosis of (Index).
- Tuberculosis, Spinal. See Spine, Diseases of.
- Tuberculosis Verrucosa. See Tuberculosis of Skin; Lupus Erythematosus.
- Tuberculosis Verrucosa Cutis. See Surgical Diseases of the Skin and its Appendages; Verruæ.
- Tuberculosis, Vesical. See Urinary System, Surgical Diseases of.
- Tuberculous Abscess. See Abscess, Tuberculous (Index).
- Tuberculous Affections. See Naphthalin; Naphthol-camphor.
- Tuberculous Broncho-pneumonia. See Pneumonia, Catarrhal.
- Tuberculous Empyema. See Empyema.
- Tuberculous Fistula. See Iodine; Iodoform.
- Tuberculous Growths. See Ozone.
- Tuberculous Gumma. See Tuberculosis of Skin; Lupus Erythematosus.
- Tuberculous Nodules. See Tuberculosis of Skin; Lupus Vulgaris.
- Tuberculous Peritonitis. See Peritonitis, Tuberculous (Index).
- Tuberculous Pylitis. See Urinary System, Diseases of; Pylitis.
- Tuberculous Tumor. See Tuberculosis of Skin; Lupus Erythematosus.
- Tuberculous Ulcer. See Tuberculosis of Skin; Lupus Erythematosus.
- Tuberculous Ulceration of Tongue. See Tongue; Ulceration.
- Tuberculous Vaginitis. See Vagina.
- Tuberculous Vulvitis. See Vagina; Vulva; Infectious Vulvitis.
- Tubers. See Tumors.
- Tubo-ovarian Abscess. See Uterine Adnexa; Inflammation of Tubes.
- Tubo-ovarian Cysts. See Uterine Adnexa; Inflammation of Tubes — Uterine Adnexa; Tumors of Ovaries.
- Tubular Breathing. See Tuberculosis of Lungs.
- Tubular Lymphangitis. See Status Lymphaticus; Lymphangitis.
- Tubulo-cysts. See Tumors; Cysts.
- Tubulo-dermoids. See Tumors; Dermoid.
- Tuffnell's Method. See Aneurism.
- Tully's Powder. See Camphor — Opium.
- Tumor Albus. See Joints; Tubercular.
- Tumor-like Masses. See Vascular System; Varix.
- TUMORS (*General Subject*). See Alcohol; Injections — Appendicitis — Arsenic — Creasote — Pregnancy, Disorders of.
- Tumors, Abdominal. See Liver, Diseases of — Pancreas; Cysts — Uterine Adnexa; Acquired Malformations of Ovaries.
- Tumors, Cartilaginous. See Cartilaginous Tumors (Index).
- Tumors, Cerebellar. See Hysteria.
- Tumors, Cerebral. See Meningitis; Leptomeningitis — Sclerosis of Brain — Brain, Tumors of (Index).
- Tumors, Cicatricial. See Surgical Diseases of the Skin and its Appendages.
- Tumors, Corneal. See Cornea.
- Tumors, Cystic. See Surgical Diseases of the Skin and its Appendages; Sebaceous Cysts.
- Tumors, Duodenal. See Intestines; Tumors.
- Tumors, Epithelial. See Epithelial Tumors (Index).
- Tumors, Gastric. See Stomach, Diseases of; Carcinoma.
- Tumors, Hepatic. See Suprarenal Capsules; Tumors.
- Tumors in Brain, Gummy. See Syphilis; Period of Sequelæ.
- Tumors in Loin. See Loin, Tumors of (Index).
- Tumors in Lumbar Region. See Urinary System, Diseases of; Pyelitis.
- Tumors in Rolandic Region. See Tumors of Brain.
- Tumors, Intestinal. See Intestinal Tumors (Index).
- Tumors, Intracranial. See Hydrocephalus.
- Tumors, Intrathoracic. See Pleurisy; Acute.
- Tumors, Labial. See Uterine Adnexa; Displacements of Ovaries.
- Tumors, Laryngeal. See Tracheo-Laryngeal Operations; Thyrotomy.
- Tumors, Malignant. See Methyl-blue.
- Tumors, Mediastinal. See Mediastinal Tumors (Index).
- Tumors, Oesophageal. See Oesophagus.
- Tumors of Abdominal Wall. See Liver; Tumors.
- Tumors of Abdominal Wall, Dermoid. See Uterine Adnexa; Tumors of Ovaries.
- Tumors of Base of Brain. See Tumors of Brain.
- Tumors of Biliary Tract. See Liver and Gall-bladder.
- Tumors of Bladder. See Urinary System, Surgical Diseases of; Hypertrophy of Prostate.
- Tumors of Blood-vessels. See Tumors; Connective Tissue.
- TUMORS OF BRAIN (*General Subject*). See Brain, Tumors of (Index) — Tumors, Cerebral (Index).
- TUMORS OF BREAST (*General Subject*).
- Tumors of Cæcum. See Cæcum, Tumors of (Index).
- Tumors of Cerebellum. See Cerebellum, Tumors of (Index).
- Tumors of Cervix. See Uterus; Carcinoma of Cervix Uteri.
- Tumors of Conjunctiva. See Conjunctiva.
- Tumors of Corpora Quadrigemina. See Tumors of Brain.
- Tumors of Corpus Callosum. See Tumors of Brain.
- Tumors of Crus. See Tumors of Brain.
- Tumors of Eyelids. See Palpebræ, Diseases of.
- Tumors of Fallopian Tubes. See Uterine Adnexa.
- Tumors of Femur. See Hip-joint Disease.
- Tumors of Foot. See Wounds and Stings; Jigger.
- Tumors of Gall-bladder. See Hydronephrosis.
- Tumors of Great Ganglia. See Tumors of Brain.
- Tumors of Ilium. See Hip-joint Disease.
- Tumors of Iris, Gummy. See Syphilis; General Infection.
- Tumors of Kidney. See Kidney, Tumors of (Index).
- Tumors of Lacrymal Gland. See Lacrymal Apparatus; Secretory Apparatus.
- Tumors of Larynx. See Larynx, Tumors of (Index).
- TUMORS OF LARYNX AND LUNGS (*General Subject*).
- Tumors of Lips. See Lips, Tumors of (Index).
- Tumors of Liver. See Liver, Tumors of (Index).
- Tumors of Lymphatic Vessels. See Tumors; Connective Tissue.
- Tumors of Maxillary Gland. See Salivary Glands; Tumors.

- Tumors of Medulla. See Tumors of Brain.
 Tumors of Mesentery. See Peritoneum; Tumors.
 Tumors of Nasal Cavities. See Nasal Cavities; Tumors.
 Tumors of Naso-pharynx. See Naso-pharynx.
 Tumors of Occipital Lobe. See Tumors of Brain.
 Tumors of Optic Nerve. See Optic Nerve, Tumors of (Index).
 Tumors of Pancreas. See Pancreas, Tumors of (Index).
 Tumors of Parietal Region. See Tumors of Brain.
 Tumors of Pelvis, Sarcomatous. See Syphilis; Period of Sequelæ.
 Tumors of Penis. See Penis and Testicles; Tumors.
 Tumors of Peritoneum. See Peritoneum.
 Tumors of Pleura. See Pleura; New Growths.
 Tumors of Pons. See Tumors of Brain.
 Tumors of Posterior Mediastinum. See Wounds and Injuries of Thorax; Posterior Thoracotomy.
 Tumors of Prostate. See Urinary System, Surgical Diseases of; Tuberculosis of Prostate.
 Tumors of Pylorus. See Pylorus, Tumors of (Index).
 TUMORS OF RECTUM AND ANUS (*General Subject*).
 Tumors of Rectum, Villous. See Tumors of Rectum and Anus; Papillomata.
 Tumors of Salivary Glands. See Salivary Glands.
 Tumors of Scalp. See Wounds of Head; Diseases of Scalp.
 Tumors of Scalp, Erectile. See Wounds of Head; Tumors of Scalp.
 Tumors of Scalp, Fatty. See Wounds of Head; Tumors of Scalp.
 Tumors of Scalp, Sebaceous. See Wounds of Head; Tumors of Scalp.
 Tumors of Skull. See Wounds of Head; Diseases Involving Skull.
 Tumors of Spinal Cord. See Spinal Cord; Tumors of (Index).
 Tumors of Spleen. See Spleen, Tumors of (Index).
 Tumors of Stomach. See Liver; Tumors.
 Tumors of Suprarenal Capsules. See Suprarenal Capsules, Diseases of.
 Tumors of Suprarenal Gland. See Liver; Cancer of Gall-bladder.
 Tumors of Temporo-Sphenoidal Lobe. See Tumors of Brain.
 Tumors of Testicles. See Testicles, Tumors of (Index).
 Tumors of Thyroid. See Thyroid Gland; Tumors.
 Tumors of Tongue. See Tongue; Tumors.
 Tumors of Transverse Colon. See Liver; Cancer of Gall-bladder.
 Tumors of Uterus. See Uterus, Tumors of (Index).
 Tumors of Uterus, Fibroid. See Uterine Adnexa; Tumors of Ovaries.
 Tumors of Uveal Tract. See Iris.
 Tumors of Vagina. See Vagina.
 Tumors of Vulva. See Vagina; Vulva.
 Tumors of Vulva, Hernial. See Vagina; Tumors of Vulva.
 Tumors of Vulvo-vaginal Glands. See Vagina; Tumors of Vulva.
 Tumors, Omental. See Omental Tumor (Index).
 Tumors on Nerves. See Tumors; Connective Tissue.
 Tumors, Orbital. See Orbit.
 Tumors, Ovarian. See Ovarian Tumors (Index).
 Tumors, Ovarian Cystic. See Uterine Adnexa; Tumors of Ovaries.
 Tumors, Pancreatic. See Pancreas, Tumors of (Index).
 Tumors, Pedunculated. See Surgical Diseases of the Skin and its Appendages; Molluscum Contagiosum.
 Tumors, Phantom. See Pregnancy, Disorders of.
 Tumors, Phantom, of Abdomen. See Hysteria.
 Tumors, Pharyngeal. See Tonsils; Tumors.
 Tumors, Pulmonary. See Tumors of Larynx and Lungs.
 Tumors, Pulmonary Malignant. See Tumors of Larynx and Lungs; Lungs.
 Tumors, Pulsating. See Aneurism.
 Tumors, Renal. See Renal Tumors (Index).
 Tumors, Retroperitoneal. See Peritoneum; Tumors.
 Tumors, Sessile. See Surgical Diseases of the Skin and its Appendages; Molluscum Contagiosum.
 Tumors, Syphilitic of Liver. See Parasites; Echino-coccus.
 Tumors, Tuberculous. See Tuberculosis of Skin; Lupus Erythematosus.
 Tumors, Vagino-Vulvar. See Parturition, Abnormal.
 Tumors, Venereal. See Vagina; Tumors of Vulva.
 Tumors, Villous. See Hemorrhoids.
 Tuning-fork Tests. See Internal Ear.
 Tunnel Anæmia. See Parasites; Intestinal; Anchylostoma.
 Turban-like Epiglottitis. See Tuberculosis of Larynx.
 Turbinate Body, Papillomatous Growths of Lower. See Nasal Cavities; Chronic Rhinitis.
 Turbinated Bones, Hypertrophy of Erectile Tissue of. See Nitric Acid.
 Turbinates, Hypertrophy of. See Nasal Cavities; Chronic Rhinitis.
 Turbinates, Intumescence of. See Nasal Cavities; Chronic Rhinitis.
 Turkey Poisoning. See Toxic Foods; Meat Poisoning.
 TURPENTINE (*General Subject*). See Croup; Membranes—Hæmaturia—Nursing; Breast-milk—Ozone.
 Turpentine, Canada. See Turpentine.
 Turpentine Eruption. See Dermatitis Medicamentosa.
 Turpentine, Oil of, Eruption of. See Dermatitis Venenata.
 Turpentine, Rectified. See Turpentine.
 Turpentine-oil. See Turpentine.
 Tussis Convulsiva. See Pertussis.
 Tussis Hepatica. See Liver; Abscess.
 Twisting, Intestinal. See Obstruction, Intestinal.
 Twitchings. See Cerebral Hemorrhage—Vascular Diseases of Brain; Thrombosis.
 Twitchings, Choreiform. See Exophthalmic Goitre.
 Twitchings, Muscular. See Meningitis—Nerves, Peripheral; Simple Neuritis—Nux Vomica; Poisoning—Phosphorus; Poisoning—Physostigma; Poisoning—Strychnine; Physiological Action—Tetanus—Uræmia—Wounds of Head; Wounds of Brain.
 Twitchings of Orbicularis Muscle. See Physostigma; Spasmodic Disorders.
 Two-Chambered Uterus. See Uterus; Malformations.
 Two-Horned Uterus. See Uterus; Malformations.
 Tympanic Perforation. See Wounds of Head; Diseases Involving Skull.
 Tympanites. See Intestines; Colon; Dilatation—Intestines; Tumors—Obstruction, Intestinal—Peritoneum; Acute Peritonitis—Typhoid—Typhoid Fever—Uterine Adnexa; Tumors of Ovaries.
 Typhlitis. See Appendicitis—Belladonna; External Uses—Intestines.
 Typhoid Bacilli. See Typhoid Fever.
 Typhoid Condition. See Wounds (Septic) and Gangrene; Septicæmia.
 TYPHOID FEVER (*General Subject*). See Acetanilid—Acetonuria—Adenitis—Alcohol; Fevers—Alcoholism; Delirium Tremens—Alum—Antipyrine—Appendicitis—Asaprol—Belladonna; Fevers—Benzanilid—Benzoic Acid—Bismuth—Boracic Acid—Coffee; Caffeine—Digitalis; Febrile Maladies—Epistaxis—Erythema Scarlatiniforme—Eucalyptus; Gastro-Intestinal Disorders—Fatty Heart—Glycerin—Guaiaicol; Fevers—Hæmaturia—Hydrochloric Acid; Fevers—Indicanuria—Infantile Myxœdema—Infants, Diarrhoeal Diseases of—Influenza—Insanity; Acute Confusional—Insanity; Post-febrile—Jaundice; Acute Infectious—Joints; Septic Arthritis—Laryngitis; Edema—Laryngitis; Symptomatic—Lead; Gastro-Intestinal Disorders—Liver; Abscess—Liver; Acute Congestion—Malarial Fevers—Meningitis; Leptomenigitis—Mercury; Iodides—Milk-fever—Mouth; Gangrenous Stomatitis—Naphthalin; Intestinal Disorders—Osseous System; Periostritis—Ox-gall—Oxygen—Pancreatin—Parasites; Trichina—Parotitis; Symptomatic—Pepsin—Peritoneum; Tuberculous Peritonitis—Phenacetin; Apolysin—Phenacetin; Methacetin—Phenic (Carbolic) Acid—Phenic (Carbolic) Acid; Bromol—Phenic (Carbolic) Acid; Sulphocarbolates—Pix Liquida; Pixol—Phosphoric Acid—Phosphorus—Pneumonia. Catarrhal—Quinine—Resorcin; Resorcin-salol—Salicylic Acid; Bismuth Salicylate—Salicylic Acid; Cresol Salicylate—Salicylic Acid; Salicyl-resorcin—Silver; Gastro-Intestinal Disorders—Spe-

- cific Infectious Fevers; Malta — Specific Infectious Fevers; Mountain-fever — Specific Infectious Fevers; Relapsing—Spleen; Hyperæmia—Stomach, Diseases of; Acute Gastritis—Stomach, Diseases of; Phlegmonous Gastritis—Sulphur; Purgation—Thymol—Toxic Foods; Ptomines—Turpentine—Typhus Fever—Valvular Diseases of Heart; Acute Endocarditis—Yellow Fever.
- Typhoid Fever, Perforation in. See Peritoneum; Acute Peritonitis—Stomach; Surgery of; Intestines; Resection.
- Typhoid Pneumonia. See Pneumonia, Typhoid (Index).
- Typholulmbriosis. See Parasites; Intestinal; Ascaris.
- Typho-malaria. See Malarial Fevers.
- Typho-malarial Fever. See Typhoid Fever; Complications.
- Typhus, Abdominal. See Typhoid Fever.
- TYPHUS FEVER (*General Subject*). See Alcoholism; Delirium Tremens—Belladonna; Fever—Digitalis; Febrile Maladies—Hæmaturia—Hæmoglobinuria—Insanity; Post-febrile—Jaundice; Toxæmia—Laryngitis; Symptomatic—Parotitis; Symptomatic—Quinine—Valvular Diseases of Heart; Acute Endocarditis; Septicæmia.
- Typhus Gravior. See Typhus Fever.
- Tyrosin Crystals in Urine. See Liver; Acute Yellow Atrophy.
- Uffelmann's Test for Lactic Acid. See Stomach, Diseases of; Carcinoma.
- Ulceration. See Aristol; Venereal Disorders—Copper—Creasote—Iodine; Iodol—Mercury; Poisoning—Orthoform—Phenacetin—Pyrogallol; Poisoning—Surgical Diseases of the Skin and its Appendages; Sebaceous Cysts—Syphilis; Primary Local Changes from Infection—Tumors; Lipomata—Ulcers (Index)—Wounds (Septic); Pressure Gangrene.
- Ulceration, Cancerous. See Chromic Acid; Antiseptic.
- Ulceration, Carcinomatous. See Chromic Acid.
- Ulceration, Corneal. See Corneal Ulceration (Index).
- Ulceration, Duodenal. See Duodenal Ulceration (Index)—Duodenal Ulcers (Index).
- Ulceration, Intestinal. See Intestinal Ulceration (Index).
- Ulceration, Laryngeal. See Leukæmia.
- Ulceration, Non-malignant of Rectum. See Rectum and Anus.
- Ulceration of Breast. See Breast, Ulceration of (Index).
- Ulceration of Cæcum. See Silver; Gastro-Intestinal Disorders.
- Ulceration of Cartilage of Larynx. See Typhoid Fever.
- Ulceration of Cervix Uteri. See Cervix Uteri; Ulceration of (Index).
- Ulceration of Prænum Linguae. See Pertussis.
- Ulceration of Mouth. See Mouth, Ulceration of (Index).
- Ulceration of Nipples. See Mammary Gland.
- Ulceration of Peyer's Patches. See Typhoid Fever.
- Ulceration of Rectum. See Rectum, Ulceration of (Index).
- Ulceration of Root of Nails. See Dermatitis Medicamentosa.
- Ulceration of Tongue. See Tongue; Ulceration of.
- Ulceration of Tongue, Syphilitic. See Tongue; Ulceration.
- Ulceration of Tongue, Tuberculous. See Tongue; Ulceration.
- Ulceration, Septal. See Europhen; Nasal Disorders.
- Ulceration, Syphilitic. See Copper; Genito-Urinary Diseases.
- Ulceration, Tubercular. See Bismuth; Locally.
- Ulceration, Uterine. See Uterine Ulceration (Index).
- Ulcerative Conjunctivitis. See Specific Infectious Fevers; Relapsing.
- Ulcerative Endocarditis. See Endocarditis, Ulcerative (Index).
- Ulcerative Eruption of Labia. See Vagina; Vulva; Tuberculous Vulvitis.
- Ulcerative Phthisis, Chronic. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
- Ulcerative Stomatitis. See Stomatitis; Ulcerative (Index).
- Ulcerative Syphilide. See Syphilis; Syphilitides.
- Ulcero-Crustaceous Syphilitides. See Syphilis; Syphilitides.
- Ulcerous Cavities. See Pancreatin.
- Ulcers. See Aiol; Disorders of the Skin—Alcohol; Externally—Aristol; Simple Ulcer—Boric Acid—Camphor; Phenicated—Chloral—Copaiba; Skin Diseases—Copper; Ulcerations—Erythroxylon Coca; Nose, Pharynx, and Larynx—Europhen; Cutaneous Disorders—Exalgin—Formaldehyde; Cutaneous Disorders—Glycerin—Hydrastis; Topical Application—Hydrogen Dioxide; Purulent Affections—Iodine; Iodoform—Iodine; Loretin—Kino—Leprosy—Linum—Manganese; External Uses—Naphthalin—Naphthalin; Iodonaphthol—Nitric Acid—Nucleins—Oxygen—Phenic (Carbolic) Acid; Chlorphenol—Phenic (Carbolic) Acid; Diaphtherin—Phenic (Carbolic) Acid; Sulphocarbolates—Phenocoll—Potassium; Chlorate—Quebracho—Quinine—Resorcin—Resorcin-eucalyptol—Resorcin; Resorcinol—Resorcin; Thio-resorcin—Salol—Silver; Surgical Disorders—Skin-grafting—Ulceration (Index)—Wounds and Stings; Land-leech—Zinc; Cutaneous Disorders.
- Ulcers, Callous. See Sulphur; Respiratory Disorders.
- Ulcers, Carcinomatous. See Stomach, Diseases of; Gastric Ulcer.
- Ulcers, Corneal. See Conjunctiva—Cornea.
- Ulcers, Diphtheritic. See Phenic (Carbolic) Acid; Trichlorophenol.
- Ulcers, Duodenal. See Duodenal Ulcers (Index).
- Ulcers, Eroding. See Stomach, Diseases of; Gastric Ulcer.
- Ulcers, Foul. See Sodium; Surgical Disorders.
- Ulcers, Gastric. See Gastric Ulcer (Index).
- Ulcers, Ichorous. See Phenacetin; Iodophenin.
- Ulcers in Mouth. See Mouth; Stomatitis.
- Ulcers, Intestinal. See Dysentery.
- Ulcers, Irritable, of Rectum. See Rectum and Anus.
- Ulcers, Leg-. See Leg-ulcer (Index).
- Ulcers, Lingual. See Tongue; Ulceration.
- Ulcers, Nasal. See Paraldehyde.
- Ulcers of Cheeks. See Cheeks, Ulcers of (Index).
- Ulcers of Duodenum. See Burns—Duodenal Ulcers (Index).
- Ulcers of Intestine, Perforating. See Stomach; Surgery of; Intestines; Resection.
- Ulcers of Larynx. See Larynx, Ulcers of (Index).
- Ulcers of Larynx, Cancerous. See Tuberculosis of Larynx.
- Ulcers of Larynx, Syphilitic. See Tuberculosis of Larynx.
- Ulcers of Lips. See Mercury; Poisoning.
- Ulcers of Mouth. See Mouth—Silver; Surgical Disorders.
- Ulcers of Nasal Septum. See Leprosy.
- Ulcers of Penis. See Penis and Testicles.
- Ulcers of Rectum. See Tumors of Rectum and Anus; Malignant Growths.
- Ulcers of Tongue, Cancerous. See Tongue; Ulceration.
- Ulcers of Tonsils. See Sodium; Gastro-Intestinal Disorders.
- Ulcers, Painful. See Resorcin.
- Ulcers, Peptic. See Stomach, Diseases of; Gastric Ulcer.
- Ulcers, Perforating. See Diabetes Mellitus—Locomotor Ataxia—Stomach, Diseases of; Gastric Ulcer.
- Ulcers, Perforating Duodenal. See Stomach; Surgery of; Intestines; Resection.
- Ulcers, Perforating Stercoral. See Stomach; Surgery of; Intestines.
- Ulcers, Rectal. See Liver; Abscess.
- Ulcers, Rodent. See Acetic Acid; Skin Diseases—Camphor; Salicylated—Palpebræ; Tumors.
- Ulcers, Round. See Stomach, Diseases of; Gastric Ulcer.
- Ulcers, Sloughing. See Pepsin—Potassium; Cautics.
- Ulcers, Syphilitic. See Syphilitic Ulcer (Index).
- Ulcers, Tuberculous. See Tuberculosis of Skin; Lupus Erythematosus.
- Ulcers, Varicose. See Europhen; Wounds—Mercury; Oxides—Vascular System; Varix.
- Ulcus Simplex. See Syphilis; General Infection.
- Ulna, Dislocations of. See Dislocations.
- Ulna, Fractures of. See Fractures.

- Ultraquinine. See Cinchona.
 Umbilical Hernia. See Hernia.
 Unconsciousness. See Syncope (Index).
 Undulant Fever. See Specific Infectious Fevers; Malta.
 Unguentum Egyptianum. See Copper.
 Unguentum Eruginis. See Copper.
 Unguentum Cr  d  . See Silver; Unofficial Salts.
 Unpeeled Mogador Colocynth. See Colocynth.
 Upper Air-passages, Catarrh of. See Thymol.
 UR  MIA (*General Subject*). See Alcoholism; Acute — Asthma — Benzoic Acid — Bright's Disease — Chloral; Diseases of Kidneys — Eclampsia — Elaterium — Erythema Symptomaticum — Gout — Hydronephrosis — Jaborandi — Juniper — Magnesia; Edema — Meningitis; Leptomeningitis — Sodium; Genito-Urinary Disorders — Urinary System, Diseases of (Surgical); Nephrotomy; Hydronephrosis — Uterus; Carcinoma of Cervix Uteri.
 Ur  mic Amaurosis. See Bright's Disease.
 Ur  mic Convulsions. See Epilepsy.
 Ur  mic Insanity. See Insanity.
 Ural. See Chloral.
 Uraline. See Chloral.
 Uralium. See Chloral.
 Uranoplasty. See Plastic Surgery; Cleft Palate.
 Urari. See Curara.
 Urbantschisch's Treatment. See Deaf-mutism.
 Urebral Fistula. See Urinary System, Diseases of (Surgical); Nephrectomy — Urinary System, Diseases of (Surgical); Ureteral Implantation.
 Ureteral Implantation. See Urinary System, Diseases of (Surgical); Uretero-Ureteral Anastomosis.
 Ureterectomy. See Urinary System, Diseases of (Surgical).
 Uretero-cystotomy. See Urinary System, Diseases of (Surgical); Ureteral Implantation.
 Ureterotomy. See Urinary System, Diseases of (Surgical); Ureters.
 Uretero-Ureteral Anastomosis. See Urinary System, Diseases of (Surgical).
 Uretero-Uterine Fistula. See Urinary System, Diseases of (Surgical); Ureteral Implantation.
 Uretero-Utero-Vaginal Fistula. See Vagina; Fistula.
 Uretero-Vaginal Fistula. See Urinary System, Diseases of (Surgical); Ureteral Implantation — Vagina; Fistula.
 Ureters, Calculi in. See Urinary System, Diseases of (Surgical); Ureters.
 Ureters, Catheterization of. See Erythroxylon Coca; Topical Application — Urinary System, Diseases of (Surgical); Nephrectomy — Urinary System, Diseases of (Surgical); Ureters.
 Ureters, Diseases of. See Urinary System, Diseases of (Surgical).
 Ureters, Hydrops of. See Urinary System, Diseases of (Surgical); Ureterectomy.
 Ureters, Injuries of. See Urinary System, Diseases of (Surgical).
 Ureters, Rupture of. See Fractures of Pelvis.
 Ureters, Stricture of. See Urinary System, Diseases of (Surgical); Ureters.
 Ureters, Suppuration in Dilated. See Urinary System, Diseases of (Surgical); Ureterectomy.
 Ureters, Surgery of. See Urinary System, Diseases of (Surgical).
 Ureters, Tuberculosis of. See Urinary System, Diseases of (Surgical); Ureterectomy.
 Ureters, Valvular Obstruction of. See Urinary System, Diseases of (Surgical); Ureters.
 Ureters, Wounds of. See Urinary System, Diseases of (Surgical); Injuries of Ureter.
 Urethane-chloral. See Chloral.
 Urethra, Anomalies of. See Urinary System, Surgical Diseases of; Urethra.
 Urethra, Bleeding from. See H  maturia.
 Urethra, Catarrh of. See Hydrastis; Catarrhal Disorders.
 Urethra, Dilatation of. See Urinary System, Surgical Diseases of; Stricture of Urethra.
 Urethra, Diseases of. See Urinary System, Surgical Diseases of.
 Urethra, Gonorrh  a of. See Urinary System, Surgical Diseases of; Gonorrh  a.
 Urethra, Herpes of. See Herpes Genitalis.
 Urethra, Injuries of. See Urinary System, Surgical Diseases of; Urethra.
 Urethra, Irrigation of. See Formaldehyde; Vesical Disorders.
 Urethra, Occlusion of. See Urinary System, Surgical Diseases of; Anomalies of Urethra.
 Urethra, Rupture of. See Fractures of Pelvis — Urinary System, Surgical Diseases of; Urethra.
 Urethra, Spasm of. See Cannabis Indica; Renal Maladies.
 Urethra, Stricture of. See Urethral Stricture (Index) — Urinary System, Surgical Diseases of — Urinary System, Surgical Diseases of; Hypertrophy of Prostate.
 Urethra, Wounds of. See Urinary System, Surgical Diseases of; Injuries of Urethra.
 Urethral Caruncle. See Phenic (Carbolic) Acid.
 Urethral Catarrh, Chronic. See Pix Liquida.
 Urethral Cancr  . See Syphilis; Initial Lesion.
 Urethral Fever. See Malarial Fevers — Quinine — Urinary System, Surgical Diseases of.
 Urethral H  morrhage. See H  maturia — Urinary System, Surgical Diseases of; Polyps.
 Urethral Irrigation. See Formaldehyde; Vesical Disorders — Urinary System, Surgical Diseases of; Gonorrh  a.
 Urethral Stricture. See Pancreatin — Urethra, Stricture of (Index).
 Urethritis. See Ichthyol; Genito-Urinary Disorders — Parturition, Abnormal — Phenic (Carbolic) Acid; Phenosalyl — Resorcin — Salol — Syphilis; Initial Lesion — Urinary System, Diseases of; Pyelitis — Urinary System, Surgical Diseases of; Acute Prostatitis — Urinary System, Surgical Diseases of; Gonorrh  a — Uterus; Prolapse.
 Urethritis, Gonorrh  al. See Silver; Largin.
 Urethrotomy. See Urinary System, Surgical Diseases of; Stricture of Urethra.
 Uric-Acid Calculi. See Lithium — Potassium; Diuretics.
 Uric-Acid Diathesis. See Colchicum; Physiological Action — Lithium; Physiological Action — Piperazin — Psoriasis.
 Uric Acid in Urine. See Hydrochloric Acid.
 Uric-Acid Lithiasis. See Boracic Acid.
 Uric-Acid Solvent. See Piperazin.
 Uric  mia. See Gout.
 Uricedin. See Gout.
 Urinary Bladder. See Bladder (Index).
 Urinary Calculi. See Digitalis — Urinary System, Surgical Diseases of; Vesical Calculi.
 Urinary Fever. See Urinary System, Surgical Diseases of.
 Urinary Fistula. See Cholelithiasis.
 Urinary Incontinence. See Enuresis (Index) — Uterus; Prolapse.
 Urinary Organs, Irritation of. See Sodium; Genito-Urinary Disorders.
 Urinary Passages, H  morrhage from. See Piperazin.
 URINARY SYSTEM, DISEASES OF (*General Subject*).
 URINARY SYSTEM, DISEASES OF (SURGICAL) (*General Subject*).
 URINARY SYSTEM, SURGICAL DISEASES OF (*General Subject*).
 Urination, Frequent. See Urinary System, Surgical Diseases of; Acute Prostatitis — Urinary System, Surgical Diseases of; Chronic Prostatitis — Urinary System, Surgical Diseases of; Hypertrophy of Prostate — Urinary System, Surgical Diseases of; Tuberculosis of Prostate — Urinary System, Surgical Diseases of; Vesical Calculi — Urinary System, Surgical Diseases of; Vesical Tuberculosis.
 Urination, Painful. See Dysuria (Index) — Sulphur; Poisoning — Urinary System, Surgical Diseases of; Acute Prostatitis — Urinary System, Surgical Diseases of; Chronic Prostatitis — Urinary System, Surgical Diseases of; Foreign Bodies in Prostate.
 Urine, Albumin in. See Albuminuria (Index).
 Urine, Ammoniacal. See Cystitis — Urinary System, Diseases of; Pyelitis.
 Urine, Bile in. See Liver; Acute Yellow Atrophy — Malarial Fevers; Pernicious — Yellow Fever.
 Urine, Bile-pigment in. See H  maturia — Jaundice, Obstructive — Liver; Angiocholitis.
 Urine, Black. See Pix Liquida; Poisoning — Resorcin; Poisoning — Salol.
 Urine, Blood in. See Cantharides; Physiological Action — Cystitis — H  maturia (Index) — H  moglobinuria (Index) — Parasites; Filaria — Stomach, Diseases of; Toxic Gastritis — Turpentine; Poisoning — Urinary System, Diseases of; Pyelitis — Urinary System, Diseases of (Surgical);

- Nephrectomy—Urinary System, Diseases of (Surgical); Nephrotomy; Hydatid Cysts—Urinary System, Diseases of (Surgical); Nephrotomy; Tuberculosis—Urinary System, Diseases of (Surgical); Renal Calculus—Urinary System, Surgical Diseases of; Hypertrophy of Prostate—Urinary System, Surgical Diseases of; Rupture of Bladder—Urinary System, Surgical Diseases of; Vesical Tuberculosis.
- Urine, Casts in. See Bright's Disease—Urinary System, Diseases of; Amyloid Kidney—Urinary System, Diseases of; Pyelitis.
- Urine, Chlorides Diminished in. See Pneumonia, Lobar.
- Urine, Chylous. See Chyluria (Index).
- Urine, Dark Red. See Rheumatism; Acute.
- Urine, Decomposition of. See Phenic (Carbolic) Acid; Diaphthol.
- Urine, Dextrose in. See Glycosuria.
- Urine, Diabetic. See Diabetis Mellitus.
- Urine, Diminished Urea in. See Parturition, Abnormal.
- Urine, Dribbling of. See Spinal Cord; Myelitis—Urinary System, Surgical Diseases of; Hypertrophy of Prostate.
- Urine, Excessive Urea in. See Rheumatism; Acute.
- Urine, Excessive Uric Acid in. See Rheumatism; Acute.
- Urine, Extravasation of. See Urinary System, Surgical Diseases of; Rupture of Urethra.
- Urine, Fatty. See Parasites; Filaria.
- Urine, Fermentation of, in Bladder. See Salol.
- Urine, Glucose in. See Diabetes Mellitus—Glycosuria.
- Urine, Hæmatoporphyrin in. See Hæmatoporphyrinuria.
- Urine, Hooklets in. See Urinary System, Diseases of (Surgical); Nephrotomy; Hydatid Cysts.
- Urine, Incontinence of. See Belladonna; Spasmodic Disorders—Cantharides—Enuresis (Index)—Lupulus—Nux Vomica; Nervous Disorders—Penis and Testicles; Phimosia—Potassium; Diuretics—Pregnancy, Disorders of—Spine, Diseases of; Bed-sores—Spine, Diseases of; Tumors—Tremors; Paralysis Agitans—Typhoid Fever—Uterus; Prolapse.
- Urine, Indian in. See Indicanuria.
- Urine, Iodine in. See Iodine—Iodine; Iodoform.
- Urine, Lactose in. See Glycosuria.
- Urine, Leucin and Tyrosin Crystals in. See Liver; Acute Yellow Atrophy.
- Urine, Levulose in. See Glycosuria.
- Urine, Morphine in. See Morphomania.
- Urine, Olive Green. See Salicylic Acid; Poisoning.
- Urine, Phenol in. See Hamaturia.
- Urine, Phosphates in. See Phosphaturia (Index).
- Urine, Pus in. See Cystitis—Urinary System, Diseases of; Pyelitis—Urinary System, Diseases of (Surgical); Nephrotomy; Hydatid Cysts—Urinary System, Diseases of (Surgical); Nephrotomy; Perinephric Abscess—Urinary System, Diseases of (Surgical); Nephrotomy; Tuberculosis—Urinary System, Diseases of (Surgical); Renal Calculus—Urinary System, Surgical Diseases of; Chronic Prostatitis—Urinary System, Surgical Diseases of; Vesical Tuberculosis.
- Urine, Red Discoloration of. See Anaigen; Physiological Action.
- Urine, Reddish Brown. See Phenocoll; Physiological Action—Sulphonal; Poisoning.
- Urine, Retention of. See Hysteria—Insanity; General Paresis—Spinal Cord; Myelitis—Spine Diseases of; Bed-sores—Spine, Diseases of; Tumors—Typhoid Fever—Urinary System, Surgical Diseases of; Hypertrophy of Prostate—Urinary System, Surgical Diseases of; Rupture of Urethra—Urinary System, Surgical Diseases of; Tumors of Prostate—Uterine Adnexa; Tumors of Ovaries—Uterus; Sarcoma—Wounds of Head; Compression of Brain.
- Urine, Saccharose in. See Glycosuria.
- Urine, Santonin in. See Hamaturia.
- Urine, Smoky. See Phenic (Carbolic) Acid; Poisoning—Pyrogallol; Poisoning.
- Urine, Sugar in. See Diabetes Mellitus—Glycosuria.
- Urine, Suppression of. See Cantharides; Urinary Suppression—Juniper—Urinary System, Diseases of (Surgical); Nephrotomy; Hydronephrosis—Phenic (Carbolic) Acid; Poisoning—Yellow Fever.
- Urine, Tests for Sugar in. See Diabetes Mellitus.
- Urine, Tubercle Bacilli in. See Urinary System, Diseases of; Pyelitis—Urinary System, Diseases of (Surgical); Nephrotomy; Tuberculosis—Urinary System, Surgical Diseases of; Tuberculosis of Prostate—Urinary System, Surgical Diseases of; Vesical Tuberculosis.
- Urine, Uric Acid in. See Hydrochloric Acid.
- Urine, Vesicles in. See Urinary System, Diseases of (Surgical); Nephrotomy; Hydatid Cysts.
- Urobilin. See Anæmia, Pernicious—Choluria—Cirrhosis of the Liver; Portal.
- Urobilinuria. See Choluria—Rheumatism; Acute.
- Uropherine "S." See Salicylic Acid; Theobromine and Lithium Salicylate.
- URTICARIA (*General Subject*). See Antipyrine; Poisoning—Arsenic; Skin Diseases—Belladonna; Cutaneous Disorders—Benzoin—Dermatitis Medicamentosa—Eczema—Erythema Multiforme—Exophthalmic Goitre—Gout—Hydrochloric Acid; Cutaneous Disorders—Ichthyol; Cutaneous Disorders—Jaborandi; Cutaneous Disorders—Jaundice; Obstructive—Laryngitis; Symptomatic—Liver; Hydatid Cyst—Menthol; Painful Disorders—Parasites; Trichina—Phenic (Carbolic) Acid; Cutaneous Disorders—Potassium; Alkaline Lotions—Respiratory Tract; Nasal Reflex Neuroses—Rheumatism; Acute—Salicylic Acid—Salophen—Sodium; Cutaneous Disorders—Specific Infectious Fevers; Dengue—Specific Infectious Fevers; Relapsing—Toxic Foods; Shellfish Poisoning.
- Urticaria, Pharyngeal. See Urticaria.
- Urticarial Eruption. See Phenacetin; Poisoning—Pix Liquida; Poisoning.
- Ustilago Maydis. See Corn-ergot.
- Uterine Adenoma. See Menopause.
- UTERINE ADNEXA, DISEASES OF (*General Subject*).
- Uterine Angioma. See Endometritis.
- Uterine Appendages, Removal of. See Insanity; Post-operative.
- Uterine Cancer. See Menopause—Sodium; Gynecological Disorders.
- Uterine Carcinoma. See Endometritis—Parturition, Abnormal—Pregnancy, Disorders of—Uterus; Myoma—Uterus; Tumors.
- Uterine Cavity, Anæsthesia of. See Erythroxylon Coca; Gynecology.
- Uterine Colic. See Atropine.
- Uterine Disorders. See Naso-pharynx; Chronic Naso-pharyngitis.
- Uterine Fibroid. See Animal Extracts; Thyroid; Uterine Disorders—Corn-ergot—Ergot; Hemorrhage—Menopause—Parturition, Abnormal—Pregnancy; Disorders of—Uterine Adnexa; Tumors of Ovaries.
- Uterine Fibroid, Subserous. See Uterine Adnexa; Tumors of Ovaries.
- Uterine Fibromyoma. See Glycerin—Goitre.
- Uterine Hæmorrhage. See Alum; Metrorrhagia—Animal Extracts; Ovarian—Animal Extracts; Thyroid; Uterine Disorders—Atropine; Hemorrhagic Disorders—Boric Acid; Sodium Bicarbonate—Cannabis Indica—Cinnamon—Endometritis—Ergot; Hæmorrhage—Hamamelis—Hydrastis; Hæmorrhage—Menopause—Menorrhagia (Index)—Metrorrhagia (Index)—Myxœdema—Oxygen; Local Uses—Salol—Uterus; Carcinoma of Cervix Uteri—Uterus; Decidua Malignum—Uterus; Sarcoma.
- Uterine Inertia. See Ipecac; Hæmorrhage—Quinine; Ecbole.
- Uterine Myoma. See Endometritis—Myoma, Uterine (Index)—Uterine Adnexa; Tumors of Ovaries—Uterus; Sarcoma—Uterus; Tumors.
- Uterine Pain. See Pregnancy, Disorders of.
- Uterine Polypi. See Erythroxylon Coca and Cocaine; Gynecology.
- Uterine Sedative. See Anemonin.
- Uterine Tuberculosis. See Endometritis.
- Uterine Ulceration. See Menopause—Silver; Gynecology.
- Uterine Vessels, Ligature of. See Uterus; Myoma.
- Uterus, Absence of. See Uterus; Malformations.
- Uterus, Actinomycosis of. See Actinomycosis.
- Uterus, Antelexion of. See Uterus—Uterus; Displacement.
- Uterus, Anteversion of. See Uterus—Uterus; Displacement.
- Uterus, Badly Nourished. See Pregnancy, Disorders of.
- Uterus, Cancer of. See Uterine Carcinoma (Index).

- Uterus, Defective. See Pregnancy, Disorders of.
 Uterus, Deviations of. See Abortion.
 UTERUS, DISEASES OF (*General Subject*). See Rectum and Anus; Irritable Ulcer.
 Uterus, Disorders of. See Animal Extracts; Thyroid—Appendicitis—Copper; Uterine Disorders.
 Uterus, Displacements of. See Metritis—Pregnancy, Disorders of—Uterus.
 Uterus, Double. See Uterus; Malformations.
 Uterus, Fibroid Tumors of. See Uterine Adnexa; Tumors of Ovaries.
 Uterus, Fixation of. See Uterine Adnexa; Inflammation of Tubes.
 Uterus, Foetal. See Uterus; Malformations.
 Uterus, Hæmorrhage from. See Uterine Hæmorrhage (Index).
 Uterus, Infantile. See Uterus; Malformations.
 Uterus, Inversion of. See Abortion—Uterus.
 Uterus, Malformations of. See Parturition, Abnormal—Uterus; Malformations.
 Uterus, Myoma of. See Uterine Myoma (Index).
 Uterus, One-Horned. See Uterus; Malformations.
 Uterus, Prolapsed of. See Uterus—Uterus; Displacement—Vagino-Perineal Injuries.
 Uterus, Puerile. See Uterus; Malformations.
 Uterus, Removal of. See Animal Extracts; Ovarian—Uterus, Diseases of.
 Uterus, Retroflexion. See Uterine Adnexa; Inflammations of Ovary—Uterus—Uterus; Displacement.
 Uterus, Retroversion of. See Uterus—Uterus; Displacement.
 Uterus, Rudimentary. See Uterus; Malformations.
 Uterus, Rupture of. See Ergot; Labor.
 Uterus, Sarcoma of. See Uterus; Myoma—Uterus; Tumors.
 Uterus, Subinvolution of. See Metritis—Uterus; Myoma—Vagino-Perineal Injuries.
 Uterus, Tuberculosis of. See Uterus.
 Uterus, Tumors of. See Parturition, Abnormal—Uterus.
 Uterus, Two-Chambered. See Uterus; Malformations.
 Uterus, Two-Horned. See Uterus; Malformations.
 Uveal Tract, Disorders of. See Iris.
 Uveal Tract, Sarcoma of. See Iris; Sarcoma.
 Uveal Tract, Tumors of. See Iris.
 Uveitis. See Iris; Iritis.
 Uvula, Paralysis of. See Diphtheria.
 Uvula, Relaxation of. See Kino.
- Vaccination. See Albuminuria—Dermatitis Gangrenosa—Dermatitis Herpetiformis—Erythema Symptomaticum—Nerves, Wounds and Injuries of—Syphilis; Congenital—Variola—Variola; Vaccinia—Variola; Varioloid.
 Vaccination-rashes. See Variola; Vaccinia.
 Vaccinia. See Blepharitis—Variola.
 Vaccinia of Eyelids. See Blepharitis.
 Vagina, Absence of. See Vagina; Absence and Defects of Structure.
 Vagina, Anæsthesia of. See Erythroxylon Coca.
 VAGINA AND VULVA, DISEASES OF (*General Subject*).
 Vagina, Artificial. See Vagina; Absence and Defects of Structure.
 Vagina, Atresia of. See Uterus; Malformations—Vagina; Absence and Defects of Structure.
 Vagina, Atrophy of. See Vagina.
 Vagina, Benign Neoplasms of. See Vagina; Non-cystic Growths.
 Vagina, Cancer of. See Menopause.
 Vagina, Carcinoma of. See Vagina; Malignant Growths.
 Vagina, Cysts of. See Vagina; Hernia.
 Vagina, Defects of. See Vagina; Absence and Defects of Structure.
 Vagina, Fibroids of. See Vagina; Non-cystic Growths.
 Vagina, Foreign Bodies in. See Vagina.
 Vagina, Fungous Growths of. See Vagina; Non-cystic Growths.
 Vagina, Gonorrhœa of. See Urinary System, Surgical Diseases of; Gonorrhœa in Women.
 Vagina, Hæmatomata of. See Vagina; Hæmatomata.
 Vagina, Herniæ within. See Vagina; Herniæ.
 Vagina, Hyperæsthesia of. See Vagina; Vaginitis.
 Vagina, Hypertrophy of. See Vagina.
- Vagina, Lipomata of. See Vagina; Non-cystic Growths.
 Vagina, Malignant Growths of. See Vagina.
 Vagina, Prolapse of. See Vagina—Vagina; Hernia—Vagino-Perineal Injuries.
 Vagina, Sarcoma of. See Vagina; Malignant Growths.
 Vagina, Subinvolution of. See Vagino-Perineal Injuries.
 Vagina, Tumors of. See Vagina.
 Vaginal Catarrh, Chronic. See Pix Liquida; Catarrhal Disorders.
 Vaginal Douching. See Mercury; Poisoning.
 Vaginal Fistula. See Vagina; Fistulæ.
 Vaginal Hysterectomy. See Uterus; Myoma—Uterus; Prolapse.
 Vaginal Injections. See Naphthalin; Naphthol—Phenic (Carbolic) Acid; Poisoning.
 Vaginal Section. See Pregnancy, Disorders of.
 Vaginismus. See Atropine; Neuralgia—Vagina.
 Vaginitis. See Cubeb; Catarrhal Disorders—Formaldehyde; Gynæcological Disorders—Phenic (Carbolic) Acid; Phenosalyl—Resorcin—Vagina.
 Vaginitis, Eczematous. See Vagina.
 Vaginitis, Diphtheritic. See Vagina.
 Vaginitis, Puerperal. See Vagina.
 Vaginitis, Tendo-. See Sulphur; Respiratory Disorders.
 Vaginitis, Traumatic. See Vagina.
 Vaginitis, Tuberculous. See Vagina.
 Vaginitis, Venereal. See Vagina.
 VAGINO-PERINEAL INJURIES (*General Subject*).
 Vagino-Vulvar Hæmatoma. See Parturition, Abnormal.
 Vagino-Vulvar Tumors. See Parturition, Abnormal.
 VALERIAN (*General Subject*).
 Valerianic Acid. See Valerian.
 Valvular Diseases of Heart. See Barium—Mitral Regurgitation (Index)—Mitral Stenosis (Index)—Myocarditis—Valvular Diseases of Heart and Endocarditis.
 VALVULAR DISEASES OF HEART AND ENDOCARDITIS (*General Subject*).
 Valvular Disorders. See Strontium.
 Valvular Heart Disease. See Pulmonary Circulation; Œdema.
 Valvular Lesions. See Digitalis; Diseases of Heart—Hypertrophy of the Heart—Valvular Diseases of Heart.
 Valvular Obstruction of Ureter. See Urinary System, Diseases of (Surgical); Ureters.
 Valzin. See Phenacetin; Dulcin.
 Van Hook's Operation. See Urinary System, Diseases of (Surgical); Uretero-Ureteral Anastomosis.
 VARICELLA (*General Subject*). See Dermatitis Gangrenosa—Laryngitis; Symptomatic—Variola.
 Varicocele. See Penis and Testicles; Hydrocele—Vagina; Vulva.
 Varicose Aneurism. See Aneurism.
 Varicose Ulcers. See Ulcers, Varicose (Index).
 Varicose Ulcers of Rectum. See Rectum and Anus; Non-malignant Ulceration.
 Varicose Veins. See Veins, Varicose (Index).
 Varicose Veins of Penis. See Penis and Testicles; Inflammatory Affections.
 Varicosed Subesophageal Veins. See Cirrhosis of the Liver; Portal.
 Varicosities. See Uterine Adnexa; Tumors of Ovaries.
 Variola. See Acne—Albuminuria—Boric Acid—Erythema Symptomaticum—Hæmaturia—Hæmoglobinuria—Laryngitis; Symptomatic—Ozone—Phenic (Carbolic) Acid; Cutaneous Disorders—Pregnancy, Disorders of—Quinine—Small-pox (Index)—Varicella—Variola; Vaccinia—Variola; Varioloid.
 Variola Eruption. See Iodine; Iodism.
 Variola Ichthyol. See Ichthyol; Cutaneous Disorders.
 VARIOLA (SMALL-POX), VACCINATION, AND VARILOID (*General Subject*).
 Varioloid. See Variola.
 Varioloid Eruption. See Iodine; Iodism.
 Varix. See Vascular System; Veins.
 Varix, Aneurismal. See Aneurism.
 Varix of Femoral Vein. See Hernia; Femoral.
 Varix of Scalp, Capillary. See Wounds of Head; Tumors of Scalp.
 Vascular Cirrhosis. See Cirrhosis of the Liver.

- Vascular Degeneration. See Syphilis; Period of Sequelæ.
- VASCULAR DISEASES OF THE BRAIN (*General Subject*).
- Vascular Fibrosis. See Pulmonary Circulation; Hemorrhage.
- Vascular Growths of Penis. See Penis and Testicles; Tumors.
- Vascular Growths of Scalp. See Wounds of Head; Tumors of Scalp.
- Vascular Obstruction. See Vascular System.
- VASCULAR SYSTEM, DISEASES OF (*General Subject*).
- Vascular System, Hypoplasia of. See Status Lymphaticus.
- VASCULO-CARDIAC NEUROSES (*General Subject*).
- Vasectomy. See Urinary System, Surgical Diseases of; Hypertrophy of Prostate.
- Vasine. See Adhatoda Justicia.
- Vasomotor Centre, Paralysis of. See Chloroform; Physiological Effects.
- Vasomotor Disturbances. See Hysteria.
- Vasomotor Paralysis. See Paralysis, Vasomotor (Index).
- Vasomotor Spasm. See Wounds (Septic); Ergot Gangrene.
- Veal-pie Poisoning. See Toxic Foods; Meat Poisoning.
- Veal, Tainted. See Toxic Foods; Ptomaines.
- Vegetable Alkaloids. See Toxic Foods; Ptomaines.
- Vegetable Cathartic Pills. See Podophyllum.
- Vegetable Poisoning. See Toxic Foods; Grain Poisoning.
- Vegetations. See Syphilis.
- Vegetations, Adenoid. See Adenoid Vegetations (Index).
- Vegetations, Venereal. See Venereal Vegetations (Index).
- Veins, Disorders of. See Vascular System; Arteritis.
- Veins, Entrance of Air into. See Vascular System.
- Veins, Injuries of. See Vascular System; Injuries of Veins.
- Veins, Varicose. See Hamamelis; Hemorrhage—Pregnancy, Disorders of—Vascular System; Phlegmasia Alba Dolens—Vascular System; Varix.
- Veins, Varicose, of Penis. See Penis and Testicles; Inflammatory Affections.
- Veins, Varicose Subesophageal. See Cirrhosis of the Liver; Portal.
- Veins, Wounds of. See Vascular System; Injuries of Veins.
- Velpeu's Dressing. See Fractures.
- Velum Palati, Paralysis of. See Wounds of Head; Compression of Brain.
- Venereal Crown. See Syphilis; General Infection.
- Venereal Disorders. See Silver.
- Venereal Sores. See Salicylic Acid—Syphilis; Initial Lesion.
- Venereal Tumors. See Vagina; Tumors of Vulva.
- Venereal Vaginitis. See Vagina.
- Venereal Vegetations. See Penis and Testicles; Tumors—Potassium; Caustics.
- Venereal Vulvitis. See Vagina; Vulva; Infectious Vuvitis.
- Venereal Warts. See Warts, Venereal (Index).
- Venesection. See Cerebral Hemorrhage—Chloroform; Methods of Resuscitation—Eclampsia—Meningitis; Leptomenigitis—Pneumonia, Catarrhal—Pneumonia, Lobar—Pulmonary Circulation; Congestion—Pulmonary Circulation; Edema—Pulmonary Emphysema; Vesicular.
- Venom of Snakes. See Toxic Foods; Ptomaines.
- Venomous Bites. See Coffee.
- Venomous Stings. See Stings, Venomous (Index).
- Venomous Wounds. See Wounds and Stings; Venomous.
- Venous Engorgement, Chronic. See Turpentine.
- Venous Hum. See Leukæmia.
- Venous Pulse, Centripetal. See Valvular Diseases of Heart; Aortic Regurgitation.
- Venous Thrombosis. See Thrombosis, Venous (Index).
- Ventral Hernia. See Hernia, Ventral (Index).
- Ventricles, Lateral, Surgery of. See Wounds of Head; Surgery of Lateral Ventricles.
- Ventricles, Left, Hypertrophy of. See Left Ventricles, Hypertrophy of (Index).
- Veratrine. See Alkaloids.
- Veratroidine. See Veratrum Viride.
- Veratrum. See Toxic Foods; Ptomaines.
- VERATRUM VIRIDE (*General Subject*). See Eclampsia.
- Verbigeration. See Insanity; Catatonia.
- Vermiform Appendix. See Appendicitis.
- Vermiform Appendix, Hernia of. See Hernia; Cæcal.
- Vermifuge. See Male Fern—Petroleum.
- Vernal Conjunctivitis. See Conjunctiva.
- Verrucæ. See Surgical Diseases of the Skin and its Appendages.
- Verrucæ Acuminata. See Surgical Diseases of the Skin and its Appendages; Verrucæ.
- Verrucæ Congenita. See Surgical Diseases of the Skin and its Appendages; Verrucæ.
- Verrucæ Digitata. See Surgical Diseases of the Skin and its Appendages; Verrucæ.
- Verrucæ Filiformis. See Surgical Diseases of the Skin and its Appendages; Verrucæ.
- Verrucæ Follicularis. See Surgical Diseases of the Skin and its Appendages; Verrucæ.
- Verrucæ Glabra. See Surgical Diseases of the Skin and its Appendages; Verrucæ.
- Verrucæ Necrogenica. See Surgical Diseases of the Skin and its Appendages; Verrucæ.
- Verrucæ Plana. See Surgical Diseases of the Skin and its Appendages; Verrucæ.
- Verrucæ Sebacæ. See Surgical Diseases of the Skin and its Appendages; Verrucæ.
- Verrucæ Senilis. See Surgical Diseases of the Skin and its Appendages; Verrucæ.
- Verrucæ Subunguinalis. See Surgical Diseases of the Skin and its Appendages; Verrucæ.
- Verrucæ Venereæ. See Surgical Diseases of the Skin and its Appendages; Verrucæ.
- Verrucæ Vulgaris. See Surgical Diseases of the Skin and its Appendages; Verrucæ.
- Verrücktheit. See Insanity; Paranoia.
- Version. See Parturition, Abnormal.
- Vertebræ, Ankylosed. See Spine, Diseases of; Tuberculosis.
- Vertebræ, Caries of. See Rectum and Anus; Fistula in Ano.
- Vertebræ, Dislocations of. See Dislocations—Spine, Diseases of; Sprain.
- Vertebræ, Fracture of. See Fractures.
- Vertebræ, Malignant Disease of. See Spine, Diseases of; Tuberculosis.
- Vertebræ, Necrosis of. See Spine, Diseases of; Tuberculosis.
- Vertebral Column. See Spine, Diseases of (Index).
- Vertebral Column, Sprain of. See Spine, Diseases of; Sprain.
- Vertical Strabismus. See Strabismus.
- Vertigo. See Bright's Disease; Chronic—Cerebral Abscess—Creasote; Poisoning—External Ear—Fatty Heart—Gelsemium; Physiological Action—Gold; Mental Disorders—Gout—Head, Injuries of—Hypertrophy of the Heart—Insolation—Internal Ear—Jaborandi; Aural Vertigo—Jaundice; Obstructive—Jequirity; Poisoning—Lead; Chronic Poisoning—Leukæmia—Meningitis—Myocarditis—Myopia—Myxædema—Neurasthenia—Petroleum; Physiological Action—Phenacetin; Lactophenin; Poisoning—Phenic (Carbolic) Acid; Poisoning—Phosphorus; Poisoning—Plague—Pseudoleukæmia—Quassia; Poisoning—Sclerosis of Brain—Spasms in Children; Tetany—Specific Infectious Fevers; Dengue—Spinal Cord; Hereditary Ataxia—Stomach, Diseases of; Chronic Gastritis—Stomach, Diseases of; Dilatation—Sulphonal; Poisoning—Thyroid Gland; Thyroiditis—Toxic Foods; Shell-fish Poisoning—Tumors of Brain—Turpentine; Physiological Action—Vascular System; Arteriosclerosis—Vasculo-Cardiac Neuroses; Slow Heart.
- Vertigo, Ear-. See Middle Ear; Chronic Otitis.
- Vertigo, Epileptiform. See Zinc; Nervous Disorders.
- Vertigo, Labyrinthine. See Internal Ear; Effusion.
- Vertigo, Stomach-. See Middle Ear; Otitis Media.
- Vesical. See Bladder (Index).
- Vesical Calculus. See Calculus, Vesical (Index).
- Vesical Catarrh. See Thymol.
- Vesical Catarrh, Chronic. See Pix Liquida.
- Vesical Colic. See Locomotor Ataxia.
- Vesical Fistula. See Vagina; Fistula.
- Vesical Irritation. See Hyoscynamus.
- Vesical Pain. See Hyoscynamus.
- Vesical Tenesmus. See Cystitis—Locomotor Ataxia—Urinary System, Diseases of; Pyelitis—Uri-

- Vesical Tenesmus.
 Vesical System, Diseases of (Surgical); Nephrotomy; Tuberculosis—Urinary System, Diseases of (Surgical); Renal Calculus—Urinary System, Surgical Diseases of; Acute Prostatitis—Urinary System, Surgical Diseases of; Hypertrophy of Prostate—Urinary System, Surgical Diseases of; Vesical Tuberculosis—Uterine Adnexa; Tumors of Ovaries.
- Vesical Tuberculosis. See Urinary System, Surgical Diseases of.
- Vesicant. See Acetic Acid—Adonis—Ammonia—Cantharides—Chloral—Chloroform—Eczema—Erythema Multiforme—Herpes—Herpes Zoster—Miliaria—Miliary Fever—Pix Liquida; Poisoning.
- Vesicles. See Salicylic Acid; Poisoning—Scabies—Variola; Vaccinia.
- Vesicles, Miliary. See Measles.
- Vesicocoele. See Vagina; Hernia.
- Vesico-Vaginal Fistula. See Vagina; Absence and Defects of Structure—Vagina; Fistula.
- Vesicular Emphysema. See Pulmonary Emphysema.
- Vesicular Eruption. See Dermatitis Herpetiformis—Dermatitis Medicamentosa—Dermatitis Venenata—Eruption, Vesicular (Index)—Varicella—Variola—Variola; Vaccinia.
- Vesicular Pneumonia. See Pneumonia, Catarrhal.
- Vesicular Syphilide. See Syphilis; Syphilides.
- Vesiculitis, Seminal. See Urinary System, Surgical Diseases of; Chronic Prostatitis.
- Vibrios. See Cholera Asiatica.
- Viburnum Prunifolium. See Parturition, Abnormal.
- Vichy. See Cystitis—Gout.
- Vicious Habits in Childhood and Youth. See Hypnotism.
- Vienna Caustic. See Potassium.
- Vienna Paste. See Potassium.
- Villate's Solution. See Zinc; Sulphate.
- Villous Growths of Bladder. See Urinary System, Diseases of (Surgical); Renal Calculus.
- Villous Papillomata. See Tumors; Epithelial.
- Villous Polypus of Rectum. See Tumors of Rectum and Anus; Papillomata.
- Villous Tumors. See Hæmorrhoids.
- Villous Tumors of Rectum. See Tumors of Rectum and Anus; Papillomata.
- Vinegar of Digitalis. See Digitalis.
- Vin Mariani. See Erythroxylon Coca.
- Virchow-Neumann Theory. See Leukæmia.
- Viscera. Hypertrophy of. See Acromegaly.
- Visceral Disturbances. See Hysteria.
- Visceral Lesions. See Abdomen.
- Vision, Dimness of. See Toxic Foods; Muscarine Poisoning—Uræmia.
- Vision, Impairment of. See Toxic Amblyopia.
- Visual Hallucinations. See Neuralgia; Migraine.
- Visual Obscurations. See Vascular Diseases of Brain; Thrombosis.
- Vitellis, Glycerite of. See Glycerin.
- Vitiligo. See Exophthalmic Goitre.
- Vitreous Humor, Opacities of. See Jaborandi; Ophthalmic Disorders—Optic Nerve and Retina; Retinitis.
- Vitriol, Blue. See Copper.
- Vitriol, White. See Zinc; Sulphate.
- Vitriol, Zinc. See Zinc; Sulphate.
- Vivagagua. See Wounds and Stings.
- Vlemmickx's Solution. See Aene.
- Vocal Cords, Paralysis of Adductors of. See Hysteria; Motor Symptoms.
- Volitional Tremor. See Sclerosis of Brain.
- Volkmann's Splint. See Fractures.
- Volvulus. See Belladonna; Spasmodic Disorders—Obstruction, Intestinal.
- Vomit, Bile-stained. See Malarial Fevers; Pernicious.
- Vomit, Black. See Jaundice; Tœxæmia—Specific Infectious Fevers; Dengue—Yellow Fever.
- Vomit, Blood-stained. See Vomiting, Bloody (Index).
- Vomit, Bloody. See Vomiting, Bloody (Index).
- Vomit, Coffee-ground. See Stomach, Diseases of; Carcinoma—Stomach, Diseases of; Dilatation.
- Vomit, White. See Yellow Fever.
- Vomiting. See Abdomen—Abortion—Acetanilid—Acetic Acid; Poisoning—Appendicitis—Arsenic; Poisoning—Bismuth—Bright's Disease—Cerebral Abscess—Cerebral Hæmorrhage—Cerium; Gastric Disorders—Chloroform; After-effects—Cholelithiasis—Cholera Infantum—Cholera Morbus—Cinnamon; Febrile Diseases—Cirrhosis of the Liver; Portal—Copper; Poisoning—Creosote; Gastro-Intestinal Disorders—Diphtheria—Elephantiasis—Emesis (Index)—Encephalitis—Erysipelas—Erythroxylon Coca—Ether; After-effects—Exophthalmic Goitre—Gaultheria; Poisoning—Guaiacol; Poisoning—Head, Injuries of—Hernia; Epigastric—Hernia; Strangulated—Hydrocephalus, Acute—Hydrochloric Acid; Gastric Disorders—Hydrochloric Acid; Poisoning—Hydrocyanic Acid; Spasmodic Disorders—Hydronephrosis—Hysteria—Infants, Diarrheal Diseases of—Influenza—Intestines; Colitis—Intestines; Tumors—Intestines; Typhilitis—Iodine; Iodoform; Untoward Effects—Iodine; Poisoning—Ipecac; Physiological Action—Jequirity; Poisoning—Lead; Poisoning—Leukæmia—Liver; Diseases of—Lobelia; Poisoning—Locomotor Ataxia—Male Fern; Poisoning—Meningitis—Menthol; Gastro-Intestinal Disorders—Mercury; Poisoning—Middle Ear; Chronic Otitis—Milk-sickness—Neuralgia; Migraine—Nitroglycerin; Gastro-Intestinal Disorders—Obstruction, Intestinal—Oxalic Acid; Poisoning—Pancreas; Acute Pancreatitis—Parasites; Trichina—Pelletierine; Physiological Action—Pericardium; Pericarditis—Peritoneum; Acute Peritonitis—Peritoneum; Ascites—Pertussis—Petroleum; Physiological Action—Phenacetin; Poisoning—Phosphorus; Poisoning—Physostigma; Poisoning—Pix Liquida; Poisoning—Pleurisy; Acute—Pneumonia, Lobar—Pneumonokonioid—Podophyllum; Poisoning—Potassium; Anti-emetics—Potassium; Poisoning—Pregnancy, Disorders of—Pyrogallol; Poisoning—Resorcin—Salicylic Acid; Poisoning—Scarlet Fever—Shock—Silver; Poisoning; Acute—Sodium; Gastro-Intestinal Disorders—Specific Infectious Fevers; Glandular—Specific Infectious Fevers; Relapsing—Spinal Cord; Poliomyelitis—Status Lymphaticus; Lymphangitis—Stomach, Diseases of; Acute Gastritis—Stomach, Diseases of; Carcinoma—Stomach, Diseases of; Chronic Gastritis—Stomach, Diseases of; Dilatation—Stomach, Diseases of; Gastric Ulcer—Stomach, Diseases of; Phlegmonous Gastritis—Stomach, Diseases of; Functional; Gastrosuccorrhœa—Stomach; Surgery of; Intestines; Enterotomy—Stomach; Surgery of; Intestines; Thrombosis—Stomach; Surgery of; Ulcer—Strontium; Gastro-Intestinal Disorders—Sulphonal; Poisoning—Sulphur; Poisoning—Suprarenal Capsules; Tumors—Surgical Diseases; Traumatic Delirium—Thymol; Physiological Action—Toxic Foods; Meat Poisoning—Toxic Foods; Muscarine Poisoning—Toxic Foods; Phalline Poisoning—Tuberculosis of Lungs; Chronic Ulcerative Phthisis—Tumors of Brain—Tumors of Brain; Tumors of Cerebellum—Tumors of Brain; Tumors of Corpora Quadrigemina—Tumors of Brain; Tumors of Pons—Turpentine; Poisoning—Typhoid Fever—Typhus Fever—Uræmia—Urinary System, Diseases of; Amyloid Kidney—Urinary System, Diseases of (Surgical); Renal Calculus—Uterine Adnexa; Tumors of Ovaries—Valerian; Physiological Action—Valvular Diseases of Heart; Acute Endocarditis—Variola—Veratrum Viride; Physiological Action—Veratrum Viride; Poisoning—Wounds (Septic) and Gangrene; Septicæmia—Wounds and Stings; Snake-bites—Yellow Fever—Zinc; Physiological Action—Zinc; Poisoning.
- Vomiting, Bloody. See Hematemesis (Index)—Intestines; Duodenum; Ulceration—Liver; Acute Yellow Atrophy—Œsophagus; Tumors—Pancreas; Acute Pancreatitis—Stomach, Diseases of; Carcinoma—Stomach, Diseases of; Gastric Ulcer—Stomach, Diseases of; Toxic Gastritis.
- Vomiting, Coffee-ground. See Nitric Acid; Poisoning.
- Vomiting, Excessive. See Atropine.
- Vomiting, Fæcal. See Obstruction, Intestinal.
- Vomiting, Infantile. See Nursing.
- Vomiting, Nervous. See Bromides; Heart Disorders—Phenic (Carbolic) Acid; Gastro-Intestinal Disorders—Stomach, Diseases of; Functional Diseases—Strontium; Gastro-Intestinal Disorders.
- Vomiting of Alcoholism. See Ipecac.
- Vomiting of Frothy Mucus. See Phenic (Carbolic) Acid; Poisoning.

- Vomiting of Phthisis. See Strychnine; Gastro-Intestinal Disorders.
- Vomiting of Pregnancy. See Pregnancy, Vomiting of (Index).
- Vomiting of Pseudomembrane. See Oesophagus; Oesophagitis.
- Vomiting, Yeasty. See Quinine; Antiseptic—Silver; Gastro-Intestinal Disorders.
- Von Graefe's Sign. See Exophthalmic Goitre.
- Vulva, Anæsthesia of. See Erythroxylon Coca; Topical Administration.
- Vulva, Atrophy of. See Vagina; Vulva.
- Vulva, Carcinoma of. See Vagina; Tumors of Vulva.
- Vulva, Diseases of. See Vagina and Vulva.
- Vulva, Eczema of. See Potassium; Alkaline Lotions—Vagina; Vulva; Infectious Vulvitis.
- Vulva, Epithelioma of. See Vagina; Tumors of Vulva.
- Vulva, Erosions of. See Urinary System, Surgical Diseases of; Gonorrhœa in Women.
- Vulva, Erysipelatous Inflammation of. See Vagina; Tumors of Vulva.
- Vulva, Furuncles of. See Vagina; Tumors of Vulva.
- Vulva, Gonorrhœa of. See Mercury; Chlorides—Urinary System, Surgical Diseases of; Gonorrhœa in Women—Vagina; Vulva; Infectious Vulvitis.
- Vulva, Hematoma of. See Vagina; Tumors of Vulva.
- Vulva, Hemorrhage from. See Vagina; Vulva; Vulvitis.
- Vulva, Hernial Tumor of. See Vagina; Tumors of Vulva.
- Vulva, Herpes of. See Herpes Genitalis.
- Vulva, Hyperæsthesia of. See Menopause—Vagina; Vaginismus.
- Vulva, Hypertrophy of. See Vagina; Vulva; Hypertrophy.
- Vulva, Itching of. See Vagina; Eczematous Vaginitis—Vagina; Vulva; Parasitic Vulvitis—Vulva, Pruritus of (Index).
- Vulva, Lupus of. See Vagina; Vulva; Tuberculous Vulvitis.
- Vulva, Oedema of. See Pregnancy, Disorders of.
- Vulva, Pruritus of. See Atropine; Cutaneous Disorders—Menopause—Potassium; Alkaline Lotions—Pregnancy, Disorders of—Sodium; Cutaneous Disorders—Vagina; Vulva; Eczematous Vulvitis.
- Vulva, Rigidity of. See Parturition, Abnormal.
- Vulva, Sarcoma of. See Vagina; Tumors of Vulva.
- Vulva, Spasm of. See Parturition, Abnormal.
- Vulva, Suppuration of. See Vagina; Vulva; Vulvitis.
- Vulva, Tumors of. See Vagina; Vulva.
- Vulva, Tumors of, Hernial. See Vagina; Tumors of Vulva.
- Vulvitis. See Vagina; Vulva.
- Vulvitis, Chancroidal. See Vagina; Vulva; Infectious Vulvitis.
- Vulvitis, Diphtheritic. See Vagina; Vulva; Infectious Vulvitis.
- Vulvitis, Eczematous. See Vagina; Vulva; Infectious Vulvitis.
- Vulvitis, Gonorrhœal. See Mercury; Chlorides—Vagina; Vulva; Infectious Vulvitis.
- Vulvitis, Infectious. See Vagina; Vulva; Vulvitis.
- Vulvitis, Parasitic. See Vagina; Vulva; Infectious Vulvitis.
- Vulvitis, Syphilitic. See Vagina; Vulva; Infectious Vulvitis.
- Vulvitis, Traumatic. See Vagina; Vulva; Vulvitis.
- Vulvitis, Tuberculous. See Vagina; Vulva; Infectious Vulvitis.
- Vulvo-Vaginal Glands, Inflammation of. See Vagina; Vulva; Vulvitis.
- Vulvo-Vaginal Glands, Tumors of. See Vagina; Tumors of Vulva.
- Vulvo-Vaginal Incisions. See Parturition, Abnormal.
- Wakefulness. See Valvular Diseases of Heart; Tricuspid Regurgitation.
- Waking Numbness. See Nerves, Peripheral; Functional Disorders.
- Walcher's Position. See Parturition, Abnormal.
- Walz's Colocynthin. See Colocynth.
- Wandering Liver. See Liver, Diseases of.
- Wandering Spleen. See Spleen, Diseases of.
- Wangenbrand. See Mouth; Gangrenous Stomatitis.
- Warburg's Tincture. See Quinine.
- Wardrop's Operation. See Aneurism.
- Warming Plasters. See Cantharides.
- Wart Horns. See Tumors; Epithelial.
- Warts. See Acetic Acid—Arsenic; Tumors—Chloral; Skin Diseases—Chromic Acid; Morbid Growths—Copper; Skin Diseases—Mercury; Nitrates—Nitric Acid; Local Uses—Potassium; Caustics—Salicylic Acid—Sodium; Surgical Disorders—Surgical Diseases of the Skin and its Appendages; Verrucæ—Tumors—Tumors; Papilloma.
- Warts, Intracystic. See Tumors; Epithelial.
- Warts, Skin. See Tumors; Epithelial.
- Warts, Venereal. See Penis and Testicles; Tumors—Surgical Diseases of the Skin and its Appendages; Verrucæ—Syphilis—Vagina; Vulva; Infectious Vulvitis.
- Warty Tubercle. See Surgical Diseases of the Skin and its Appendages; Verrucæ.
- Washed Sulphur. See Sulphur.
- Washer-women's Itch. See Eczema.
- Washing Soda. See Sodium.
- Wasp-stings. See Stings, Wasp—(Index).
- Wasting Diseases. See Olive-oil—Pancreatin.
- Water-brash. See Belladonna; Gastro-Intestinal Disorders.
- "Water-hammer" Pulse. See Valvular Diseases of Heart; Aortic Regurgitation.
- Watery Sputum. See Tuberculosis of Lungs; Chronic Ulcerative Phthisis.
- Wax in Ear. See Ear, Wax in (Index).
- Waxy Deposit in Spleen. See Spleen; Lardaceous Disease.
- Waxy Kidney. See Urinary System, Diseases of.
- Waxy Liver. See Liver; Amyloid.
- Weaning. See Nursing.
- Weber's Test. See Internal Ear.
- Weichselbaum-Jaeger Diplococcus. See Meningitis; Cerebro-Spinal.
- Weil's Disease. See Jaundice; Acute Infectious—Jaundice; Toxæmia.
- Weir Mitchell Rest-cure. See Rest-cure, Weir Mitchell's.
- Wens. See Surgical Diseases of the Skin and its Appendages; Sebaceous Cysts—Wounds of Head; Tumors of Scalp.
- Wernicke, Hemiplegic Pupillary Reflex of. See Tumors of Brain; Tumors of Crus.
- Westphal's Pseudosclérose en Plaques. See Sclerosis of Brain.
- Westphal's Symptom. See Locomotor Ataxia.
- West's Morning Paralysis. See Spinal Cord; Poliomyelitis.
- Wet-nursing. See Nursing.
- Wharton Jones's Operation. See Palpebræ; Ectropion.
- Wheals. See Urticaria.
- Whip-worm. See Parasites; Intestinal; Trichocephalus.
- Whisky. See Alcohol.
- Whisper-resonance. See Tuberculosis of Lungs.
- White Leg. See Vascular System; Phlegmasia Alba Dolens.
- White Spots on Nails. See Sulphur; Cutaneous Disorders.
- White Swelling of the Knee. See Joints; Tubercular.
- White Vitriol. See Zinc; Sulphate.
- White Vomit. See Yellow Fever.
- Whitehead's Operation. See Hemorrhoids.
- Whitlow. See Tendons; Tenosynovitis.
- Whitman Apparatus. See Spine, Diseases of; Tuberculosis.
- Whooping-cough. See Bromides; Chorea; Convulsive Maladies—Cantharides; Scurvy; Whooping-cough—Cerium; Nervous Disorders—Chloral—Chloroform; Therapeutics—Creasote—Ichthyol; Miscellaneous Disorders—Infantile Myxœdema—Iodine; Soziodiol—Nitric Acid—Pertussis (Index)—Petroleum—Pneumonia, Catarrhal—Spine, Diseases of; Tuberculosis—Thymol.
- Whytt's Tincture. See Cinchona; Preparations.
- Widal's Serum-reaction. See Typhoid Fever.
- Wine, Burgundy. See Alcohol.
- Winter Cough. See Cough, Winter (Index).
- Winter Laryngitis. See Laryngitis; Chronic.
- Wintergreen. See Gaultheria.
- Wintergreen, Oil of. See Salicylic Acid.
- Winter's Trajectory. See Wounds of Head; Gun-shot Wounds.
- Wistar's Cough-lozenges. See Licorice—Opium.

- Witch-hazel. See Hamamelis.
 Witzel's Method of Gastrostomy. See Stomach; Surgery of; Gastrostomy.
 Wolfe's Method of Skin-grafting. See Skin-grafting.
 Wood-alcohol. See Formaldehyde.
 Woodbridge Treatment. See Typhoid Fever.
 Wood's Operation. See Urinary System, Surgical Diseases of; Injuries of Bladder.
 Wood-spirit. See Alcohol.
 Wood-tar. See Creasote.
 Wood-tick. See Wounds and Stings.
 Wool-sorters' Disease. See Anthrax.
 Woorara. See Curara.
 Woorari. See Curara.
 Word-blindness. See Aphasia—Tumors of Brain; Tumors of Parietal Region—Vascular Diseases of Brain; Sylvian Artery—Wounds of Head; Wounds of Brain.
 Word-deafness. See Aphasia—Tumors of Brain; Tumors of Temporo-Sphenoidal Lobe—Vascular Diseases of Brain; Sylvian Artery.
 Worm-colic. See Colic, Worm (Index).
 Worms in Children. See Spine, Diseases of; Tuberculosis.
 Worms, Lumbricoid. See Ox-gall—Parasites; Intestinal; Ascaris.
 Worms, Round. See Salicylic Acid.
 Worms, Seat-. See Naphthalin; Anthelmintic—Parasites; Intestinal; Oxyuris—Salicylic Acid—Sodium; Gastro-Intestinal Disorders.
 Worms, Sucking. See Parasites; Trematodes.
 Worms, Tape-. See Colchicum; General Maladies—Copper—Liver; Hydatids—Male Fern—Naphthalin; Anthelmintic—Parasites; Intestinal—Pelletierie—Petroleum—Salicylic Acid—Turpentine.
 Worms, Thread-. See Glycosuria—Parasites; Intestinal Oxyuris—Quassia—Salicylic Acid.
 Worms, Whip-. See Parasites; Intestinal; Trichocephalus.
 Wormwood. See Absinthium.
 Wound Fever, Primary. See Surgical Diseases; Traumatic Fevers.
 Wound Fever, Secondary. See Surgical Diseases; Traumatic Fevers.
 Wounds. See Alumol; Surgical Dressing—Ammonium—Amylform—Aristol—Benzoic Acid—Benzoin—Boric Acid—Cinnamon; Antiseptic—Ethyl-chloride; Local Anesthesia—Euphen—Formaldehyde; Cutaneous Disorders—Glycerin—Hamamelis—Hydrogen Dioxide; Purulent Affections—Ichthylol—Iodine—Iodine; Iodoform—Iodine; Iodoformogen—Manganese; External Uses—Mercury; Chlorides—Methyl-blue—Naphthalin—Naphthalin; Iodonaphthol—Olive-oil—Oxygen—Phenic (Carbolic) Acid—Phenic (Carbolic) Acid; Diaphtherin—Phenic (Carbolic) Acid; Sulphocarbolates—Phenocoll—Pix Liquida; Lysol—Quebracho—Quinine—Rabies—Resorcin; Pyrocatechin—Resorcin; Resorcin-eucalyptol—Resorein; Resorcinol—Salicylic Acid; Ferric Salicylate—Salol—Silver; Silver Citrate—Skin-grafting—Surgical Diseases; Aseptic Fever.
 WOUNDS AND INJURIES OF HEAD (*General Subject*).
 Wounds and Injuries of Tendons. See Tendons.
 WOUNDS AND INJURIES OF THORAX AND THORACIC VISCERA (*General Subject*).
 WOUNDS AND STINGS, VENOMOUS (*General Subject*).
 Wounds, Bullet. See Abdomen—Fractures.
 Wounds, Infectious. See Phenacetin; Iodophenin.
 Wounds, Intestinal. See Stomach; Surgery of; Intestines; Resection.
 Wounds, Non-penetrating Abdominal. See Abdomen.
 Wounds of Arteries. See Vascular System; Injuries of Arteries.
 Wounds of Brain. See Wounds of Head; Diseases Involving Skull.
 Wounds of Conjunctiva. See Conjunctiva.
 Wounds of Head, Gunshot. See Wounds of Head; Diseases Involving Skull.
 Wounds of Heart. See Wounds and Injuries of Thorax; Wounds of Heart.
 Wounds of Kidney. See Kidney, Wounds of (Index).
 Wounds of Lateral Sinuses. See Wounds of Head; Wounds of Sinuses of Brain.
 Wounds of Liver. See Liver, Wounds of (Index).
 Wounds of Lung. See Lungs, Wounds of (Index).
 Wounds of Muscles. See Muscles; Surgical Diseases.
 Wounds of Nerves. See Nerves, Wounds and Injuries of.
 Wounds of Penis. See Penis and Testicles; Injuries.
 Wounds of Pericardium. See Wounds and Injuries of Thorax; Wounds of Heart.
 Wounds of Pleura. See Wounds and Injuries of Thorax; Injuries of Pleura.
 Wounds of Prostate. See Urinary System, Surgical Diseases of; Prostate.
 Wounds of Sinuses of Brain. See Wounds of Head; Diseases Involving Skull.
 Wounds of Spine. See Spine, Diseases of.
 Wounds of Spleen. See Abdomen; Penetrating Wounds.
 Wounds of Stomach. See Abdomen; Penetrating Wounds.
 Wounds of Superior Longitudinal Sinuses. See Wounds of Head; Wounds of Sinuses of Brain.
 Wounds of Tendons. See Tendons; Wounds and Injuries.
 Wounds of Ureter. See Urinary System, Diseases of (Surgical); Injuries of Ureter.
 Wounds of Urethra. See Urinary System, Surgical Diseases of; Injuries of Urethra.
 Wounds of Veins. See Vascular System; Injuries of Veins.
 Wounds, Penetrating Abdominal. See Abdomen.
 Wounds, Purulent. See Phenacetin; Iodophenin—Phenic (Carbolic) Acid; Bromol.
 WOUNDS (SEPTIC) AND GANGRENE (*General Subject*).
 Wounds, Sloughing. See Pepsin—Resorcin.
 Wounds, Stab. See Abdomen.
 Wounds, Suppurating. See Silver; Surgical Disorders.
 Wourali. See Curara.
 Wrinkled Lid. See Blepharitis.
 Wrist-clonus. See Cerebral Hemorrhage—Spinal Cord; Amyotrophic Sclerosis.
 Wrist-drop. See Beriberi—Iodine—Lead; Chronic Poisoning—Mercury; Chronic Poisoning—Nerves, Peripheral; Multiple Neuritis.
 Wrists, (Edema of. See Scorbutus.
 Writers' Cramp. See Physostigma.
 "Writing Hand." See Spasms in Children; Tetany.
 Wryneck. See Muscles, Surgical Diseases of; Torticollis—Rheumatism; Muscular—Torticollis (Index).
 Wryneck, Spasmodic. See Nerves, Peripheral; Localized Neuritis.
 Xanthelasma. See Jaundice; Obstructive—Palpebræ; Tumors.
 Xanthin. See Buckthorn.
 Xanthoprotein Test. See Albuminuria.
 Xanthopuccine. See Hydrastis.
 Xerosis. See Conjunctiva; Granular Conjunctivitis.
 Xerosis of the Conjunctiva. See Leprosy.
 Xerostomia. See Gout—Salivary Glands.
 Xerotic Keratitis. See Keratitis.
 X-ray. See Aneurism—Fractures—Gout—Roentgen Rays (Index)—Wounds of Head; Gunshot Wounds.
 X-ray Burns. See Burns.
 X-ray, Cause of Alopecia. See Alopecia Areata.
 Yawning. See Cerebral Hemorrhage—Tetanus—Vascular Diseases of Brain; Thrombosis.
 Yeast. See Nucleins.
 Yeast-fungi. See Stomach, Diseases of; Dilatation.
 Yeast-nucleinic Acid. See Wounds (Septic) and Gangrene; Septicæmia.
 Yeasty Vomiting. See Quinine; Antiseptic—Sodium; Gastro-Intestinal Disorders.
 Yellow Atrophy of Liver, Acute. See Liver; Acute
 Yellow Atrophy—Typhoid Fever; Complications—Valvular Diseases of Heart; Acute Endocarditis.
 YELLOW FEVER (*General Subject*). See Bright's Disease—Erythroxylon Coca—Hæmaturia—Jaundice; Toxæmia—Liver; Active Congestion—Malarial Fever—Mercury—Quinine—Specific Infectious Fevers; Dengue.
 Yellow Palms. See Typhoid Fever.
 Yellow Wash. See Mercury.
 Yersin's Bacillus. See Plague.
 Yersin's Serum. See Plague.

- Zea Mays. See Corn-ergot.
ZINC (*General Subject*).
Zinc, Butter of. See Zinc.
Zinc Ointment. See Zinc; Oxid. of.
Zinc-Salt Poisoning. See Zinc.
Zinc Vitriol. See Zinc; Sulphate of.
Zona. See Herpes Zoster.
Zona of Mouth. See Mouth.
Zonula, Senescence of. See Lens; Anomalies of Position.
Zoögrafts. See Skin-grafting.
Zoster Abdominalis. See Herpes Zoster.
Zoster Atypicus Gangrenosus et Hystericus. See Herpes Zoster.
Zoster Auricularis. See Herpes Zoster.
Zoster Brachialis. See Herpes Zoster.
Zoster Capillitii. See Herpes Zoster.
Zoster Femoralis. See Herpes Zoster.
Zoster Frontalis. See Herpes Zoster.
Zoster Hæmorrhagicus. See Herpes Zoster.
Zoster Ophthalmicus. See Herpes Zoster.
Zoster Pectoralis. See Herpes Zoster.
Zuckerguss Leber. See Cirrhosis of the Liver; Secondary.
Zwangsvorstellungen. See Insanity.
Zygoma, Fracture of. See Fractures.



Form L9-50m-11,'50(2554)444

THE LIBRARY
UNIVERSITY OF CALIFORNIA
LOS ANGELES

UNIVERSITY OF CALIFORNIA LIBRARY

Los Angeles

This book is DUE on the last date stamped below.

Form L9-50m-11,'50(2554)444

THE LIBRARY
UNIVERSITY OF CALIFORNIA
LOS ANGELES

WB
Y3
S158w
1898
v.6

UC SOUTHERN REGIONAL LIBRARY FACILITY



D 000 145 884 3

